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ABSTRACT

This study examines the Detroit Public Schools Department of Facilities Management and Capital Improvements Center (DFMCI) in the following five areas: 1) establishing the DFMCI's status in its organizational structure, functions, and operations; 2) determining the pertinent parameters/measures for the DFMCI's success; 3) evaluating the DFMCI using these parameters; 4) identifying shortcomings and challenges associated with the DFMCI's set-up, functions, and operations; and 5) developing recommendations for improvements in a continual mode. Based on the study's findings, the report provides a set of recommendations to be considered by the DFMCI to impart improvements on its administration and operations. Exhibits of various reports, forms, and maintenance employee directory conclude the report. (GR)

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Evaluation and Improvement of the Functions and Operations of the DPS FMCI Service Center

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Final Report

Submitted to: Detroit Public Schools
Department of Facilities Management and Capital Improvements

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EXECUTIVE SUMMARY

The study reported herein was performed by the Department of Civil and Environmental Engineering of Wayne State University under a contract with the Detroit Public Schools Department of Facilities Management and Capital Improvements. It aimed at:

- Establishing the present status of the Center's organizational structure, functions, and operations;
- Establishing the pertinent parameters/ measures of the Center's "success"; e.g. productivity;
- Evaluating the Center using these parameters;
- Identifying the shortcomings and challenges associated with the Center's set-up, functions and operations; and
- Developing recommendations for improvements in a continual mode.

The work undertaken to meet these objectives included a baseline study to establish the present status of the Service Center's functions and operations; a benchmarking effort to review the best practices adopted by the facilities departments of other educational institutions; development of an evaluation system and framework; using this framework to perform a detailed evaluation; and development of recommendations for the improvement of the Service Center's operations based on the study findings.

The baseline study established the present status of the DPS FMCI hierarchy and Service Center's organizational format, as well as the processes utilized in the maintenance and repair operations, with special emphasis on the Service Call Software which is used by the newly established Service Referral Desk and other DPS units networked with it. In the benchmarking study, visits to the web sites of several public school districts and universities revealed that many of the facilities departments display useful information on the organizational structure, roles and responsibilities of related units, scopes and work descriptions of the trades people and other personnel, and project details. It was also noted that these departments are making extensive use of information technology (computers and the Internet) for communications between the facilities personnel and units requesting service, and for reporting, tracking and documenting project work.

Total Quality Management (TQM) principles based on customer focus and process improvement was the essence of the evaluation framework developed. Interviews were conducted with Service Center and other DPS personnel (users of the services) to determine the processes involved in the operations of the Center and to evaluate what is and is not working well as perceived by them. It was found that the Service Center personnel at the Building Repair Unit housed at the Willis Warehouse facility are aware of their roles and responsibilities; however these are not well documented. A personnel directory was initiated to address this situation, along with job scope and job descriptions for the trades and support units of the Center. A flow chart of the Center's operations was developed to establish the current status of interfaces and groups involved in service related processes. It became evident in this study that there are some ambiguities and

possible overlaps and gaps in the roles of certain positions and units, and this challenges the efficiency of the operations.

It was found through our evaluations that the trades are generally satisfied with their work environment as long as there are no interruptions (by superiors) and unrealistic demands by the schools they service. On the other hand, the trades, as well as the operating engineers, are dissatisfied by the cumbersome paper work associated with purchasing (of especially materials). Another revelation of this study was the probable lack of understanding of the difference between an alteration and a maintenance request by the schools which is causing delays and conflicts. It was observed that there is a shortage of adequate workforce in the Building Repair Unit to meet the service demand coming from the schools, and training programs for skill upgrades have been very limited. The use of information technology is well received by the trades and other units; however, the progress with it has been slow, including the use of the Service Call software. Within the bounds of this study, our overall observations showed that the trades people in the DPSFMCI system are mostly skilled, and appear dedicated to doing a good job in their work. From the customers' (schools') perspective, the work product of the trades are considered generally satisfactory, except for the long response time in starting the jobs and completing them.

Based on the findings and evaluation results of the study, it is recommended that:

- First and foremost, DPSFMCI and its Service Center should adopt a TQM framework for the delivery of its services through an integrated approach aimed at improving customer service by improving the relevant processes in a continual mode.
- Factors and processes elaborated on in regard to response time should be analyzed in depth with a view towards correcting the deficiencies.
- The administrative structure of the Building Repair Unit should be reorganized to improve the coordination of work between different groups/units and to better define roles and responsibilities.
- Workforce needs and training requirements of the Service Center personnel should be assessed and properly addressed by the DPS FMCI Department.
- The utility and effectiveness of the existing forms presently used in the operations should be assessed and necessary improvements should be realized. Computerization of the forms and their integration with the Service Call software should be given serious consideration. Necessary steps should be taken to fully implement Service Call, networked between the trades, the schools and the Service Referral Desk.
- Communications should be improved at all levels and the schools should be provided up – to – date information on Service Center's operational system, policies and services.
- The personnel directory and job scope statements initiated as part of this study should be completed and a web site should be developed by the Building Repair Unit / Service Center for communication of information, as well as project management functions.

INTRODUCTION

The Department of Facilities Management and Capital Improvements (FMCI) of the Detroit Public Schools (DPS) is the support arm of the organization which is charged with providing a clean, safe and healthy learning environment for Detroit students. Within this scope, it oversees the work of 3,000 employees in the design, construction, maintenance, repair, upkeep and operation of over 300 district facilities, including 263 schools.

DPS facilities, with an average age of 62 years, require significant service. On the average 100 emergency requests are received by FMCI per day, in addition to a large number of routine requests. Responding to these requests in a timely and effective manner presents a formidable challenge to FMCI. Thus, it has recently established a Service Center housed in the Building Repair Unit (BRU) to better plan, prioritize, schedule, and coordinate the work in responding to the requests.

In order for the Service Center to be successful, FMCI must understand the factors affecting its operations and their productivity, and establish a continual evaluation and improvement framework to foster sustained efficacy. It was decided that there was a need for a study, which was directed to:

- Establishing the current status of the Center's organizational structure, functions, and operations;
- Establishing a framework of pertinent parameters/ measures of the Center's "success"; e.g. operational productivity;
- Evaluating the Center using this framework;
- Identifying the shortcomings and challenges associated with the Center's set-up, functions and operations; and
- Developing recommendations for improvements in a continual mode.

The following tasks were completed to accomplish the above-stated objectives:

Baseline Study : Baseline information was complied on the current status of: the Service Center's organizational structure; operational policies and procedures in regard to receiving, prioritizing, processing and tracking work requests; its interfaces with other units in DPS/FMCI and with external agencies (e.g. vendors); its work performance evaluation and closure procedures. This was accomplished mainly by studying existing documents, conducting interviews with key FMCI and BRU personnel, a focused study on the functions and operations of the SRD, and examining the Service Call software adapted by DPS to facilitate the Center's operations.

Benchmarking: The aim of the benchmarking effort was to review existing best practices of facilities management functions and operations in major public school districts and selected institutions of higher education in the U.S.A, to draw comparisons

between these practices and those of DPS FMCI; and generate ideas which can be adopted by DPS FMCI to improve its system.

The main thrust of this phase of the study was an Internet research. Numerous web sites belonging to public school districts of major U.S. cities were identified and visited, along with those of major universities. Attention was directed to:

- General information about the facilities management department;
- Organizational structure and personnel;
- Nature and scope of services provided to the district;
- The ways and means of providing these services; and
- Management of operations, projects, and project information.

In view of the very large number of web sites, which exist on the Internet, in-depth research could be performed on just a few. Consequently, we selected those public school districts and universities whose web sites provided the most comprehensive and relevant information for our study.

Evaluation Framework Development: Before an effective evaluation of the Service Center's functions and operations could be begun, an effort was undertaken to develop a system and framework to accomplish this task. In addition to the information identified in the Benchmarking Study, this included:

- A survey of existing information on the evaluation of organizational effectiveness (from the web and the literature); and
- Meetings / interactions with key groups and personnel from DPS FMCI to obtain input on effective and realistic ways to evaluate their operations;

This led to the identification of evaluation parameters and the construction of a framework for use in interviews with the various trades and other DPS FMCI units to collect information on administrative structures, operations, roles and responsibilities of personnel, work processes, and performance of the trades and related service groups.

Evaluations: Based on the analysis and synthesis of information collected from the DPS personnel involved in the Center's operations (as providers and receivers of the services), its functions and operational system were evaluated using the framework developed in the previous task. Total quality management principles focusing on customer service and continual process improvement was the essence of this framework.

The evaluations administrative and operational strengths and weaknesses were mainly based on interviews conducted with the Building Repair Unit Program Supervisor, and key personnel from plumbers, painters and glaziers, electricians, carpenters, steamfitters, construction trades, machine shop, lock shop, as well as the Planning/Scheduling Unit, the Facilities Design and Construction group, and the operating engineers based in various schools.

Development of Recommendations: The information elicited from the interviews not only assisted in performing our evaluations but also served as the foundation for the recommendations developed in this study in regard to the improvements of the functions and operations of the Service Center. Upon completion of the evaluations a set of recommendations was developed to aid in the improvement of the relevant administrative structures and work processes. This concluded our study.

Report: In the following sections of this report, we present the findings of this study leading to the evaluation of the Service Center's functions and operations. Based on these evaluations, we provide a set of recommendations to be considered by DPS FMCI to impart improvements on the administration and operations of the Center. References and Appendices containing key exhibits complete the report.

STUDY FINDINGS AND EVALUATIONS

Baseline Study : This phase of the project was performed in November and December 1998; so, the findings reported reflect the status of DPS at that time. It should be noted that significant changes have been taking place over the past six months in the system, some of which are reported later in the this report. A summary of baseline findings follows:

1. At the time our Baseline Study was performed, we observed that the current status of the organizational hierarchy for the DPS Department of Facilities Management and Capital Improvements Department would be illustrated by the chart in Exhibit I. This chart shows that the Assistant Superintendent of DPS is under the Associate Superintendent of DPS, who is the Chief Operations Officer. The Assistant Superintendent oversees Planning and Real Estate Administration and Environmental Health and Safety, and through the Executive Director of Physical Facilities and Capital Improvements, administers: Building Repair Unit, Building Operations and Utilities, Financial Control Center, Facilities Design and Construction, Capital Improvement Program, House Keeping Services, and Community Use. The Building Repair Unit and the Building Operations and Utilities group are housed at the Willis Warehouse / Facilities Operations Center. The House Keeping Services has been recently moved to Drew School (in old area B), where it presently resides. The rest of the mentioned units are housed on the fifth floor of the Detroit Schools Center Building.

2. Maintenance and repair services to the DPS facilities are primarily provided by the Building Repair Unit, supported by Building Operations and Utilities (for mechanical systems), Facilities Design and Construction (architectural/engineering services, construction inspection, project management support), House Keeping Services (for routine minor maintenance items), and Landscape / Hardscape Services (for ground related work). New construction and major upgrade projects are performed under the auspices of the Capital Improvement Program. Financial Control Center provides accounting and related services to all of these groups. Community Use coordinates the use of the physical facilities by non-academic entities such as Boyscouts, community groups, etc., and for holding elections, and similar functions. A majority of the schools have their own operating engineers; however, about 40 of the smaller schools do not, and rely on the services of the Building Operations and Utilities Group (the Engineering Lab) to operate and maintain their HVAC and other mechanical systems.

3. Exhibit II displays the current organizational chart for the Building Repair Unit, which is the focal point of the facilities service delivery system for DPS. This group is headed by a Program Supervisor, who reports to the Assistant Superintendent, and oversees the operations of the recently instigated Service Referral Desk and Planning/Scheduling Unit, and through a Program Associate (to be appointed), the Shop Stock, along with the trade groups; The trades housed in the Building Repair Unit are: Asbestos Abaters; Carpenters; Steamfitters (including pipefitters and sheet metal workers); Electricians; Plumbers (including sewer maintenance crew); Painters (including glaziers); and Construction

Trades (plasterers, brick layers, cement and ceramic workers, roofers, and laborers). The Machine Shop, Lock Shop, and Landscape/Hardscape Services are the other groups providing support to the Building Repair Unit and are administered by the Program Supervisor. The hierarchical structure of the trades typically consists of a General Foreman, Assistant General Foreman (or foremen), subforemen, and tradesmen.

4. The Department of Facilities Management and Capital Improvements has established a Service Referral Desk (SRD), which serves as a Facilities Service Center, receiving all trouble calls for maintenance and repair throughout the district. This group is composed of trained staff with telephones and computers housed in an office at the Willis Warehouse. The staff performs the following functions:

- Log all calls through data entry using the Service Call software;
- Screen the calls to identify the problem;
- Prioritize and schedule work requests;
- Refer and disperse work orders to proper work centers (i.e. trades);
- Track / follow up work order assignments; and
- Provide recommendations/ referrals to the Capital Improvements Program.

Within the current set-up the Planning/Scheduling Unit furnishes a modest amount of support to the Service Referral Desk in terms of prioritizing and scheduling the work orders.

5. Currently, the Service Referral Desk (SRD) has adopted the following operational procedures:

- Principals, engineers or custodians at schools call SRD, where 3 staff persons receive the call and prepare a corrective maintenance work order concomitantly using the Service Call software. All incoming calls to SRD are considered "emergency requests". On the average, between 50 and 100 calls are daily received by this unit, leading to a backlog of unfinished orders. Other routine maintenance requests come to the Planning/Scheduling Unit by telephone, fax or mail, and are handled by them separately.
- A copy of a typical work order prepared by the SRD staff is presented in Exhibit III. Information on this form is first recorded for reporting date, school name, location code, contact person, and telephone number, along with the description of the problem or request. The staff person then decides on the appropriate trade involved and refers the request to the relevant person in that group (usually the general foreman) on the assigned date. In response, the job is estimated in terms of the materials and labor, work hours required, and the resulting cost, and this information is entered into the computer (by the trades via Service Call software, or by the SRD staff if hard copy is provided). The work is subsequently scheduled for a due date, performed, and recorded by the work crew. The information on progress and close out can thus be tracked interactively, enabling SRD staff to respond to inquiries by the requesters. When multiple trades are involved, arrangements are made between the trades through foremen by using an interdepartmental service request (Exhibit IV)

- Prioritization of work orders can be subjective. Upper management might be involved in some prioritization decisions. When the SRD staff are not able to prioritize the work orders by their own judgement, they might consult the Program Supervisor or the Planning/Scheduling Unit. The staff of this unit is charged with scheduling and coordinating the activities of the more significant work orders.

6. When the work, or a part of thereof, can not be performed by the Building Repair Unit's own forces, it is contracted out. DPS has a list of approved vendors, which might be hired for a particular job, or the job might be bid out to the lowest reasonable bidder. Jobs under $15,000 and emergencies do not require the Board's approval.

7. The annual operational budget of FMCI is $135,000,000, which goes up to about $150,000,000 with overtime charges. Approximately 80 percent of this budget is salaries. The Building Repair Unit is allocated a base budget of $20,000,000, which rises to $32,000,000 with overtime charges. About $25,000,000 of this amount is salaries/labor, leaving $7,000,000 for material purchases. These budgets are commonly overrun. Each FMCI department is given its own budget to manage under the current system. The accounting of the individual preventive and corrective maintenance projects is performed by the Financial Control Center. School principles also have their own budgets. For routine (preventative) maintenance and emergencies, DPS covers the costs. For corrective maintenance projects, the estimated charges are assessed to the schools. The Capital Improvement Program covers major building and renovation projects and is funded by a bond issue. An audit program has recently been established to ensure effective management of the payroll and material purchase order records.

8. The Facilities Management and Capital Improvements Department have adopted the Service Call software for its maintenance management operations. This software has been chosen among several alternatives mainly because of the simplicity of its use. The software has been initially installed on the computers of the Service Referral Desk, of the Program Supervisor, of the trades departments, and of the Planning/Scheduling Unit. Initially, as a pilot project, five schools (Ludington, Cleveland, Central, Stuart and Cass Tech) were selected to gain access to this software, which was installed on their computers enabling communications on maintenance items on-line. Besides its capability to produce and track work orders, the Service Call software has the capability to receive work requests and send back notifications (by e-mail), to manage the quantities and costs of inventory items, preventive maintenance, and assets, and it can produce graphs by hours, costs, or counts. At the time of the Baseline Study, primarily the work order feature of the software is being utilized between the SRD staff and one of the trades. Some training was provided to the trades, and it is expected that all trades would eventually join in. It was indicated that the plan was eventually make this software fully operational between all of the schools, SRD, Planning/Scheduling Unit, trades, and all other appropriate entities in the DPS district. This would ease the current paperwork overburden in the system and increase the efficiency of service delivery. A synopsis of the Service Call software (Version 2.1) is provided in Exhibit V to describe the details of its features.

Benchmark Study: The findings of this phase of the project are presented in Exhibit VI. Detailed information is given on the Division of Facilities and Maintenance Services of Milwaukee Public Schools, the Maintenance Division of the Facilities Department of Minneapolis Public Schools, and the Facility Management Department of the University of Michigan. On these organizations' web sites, information can be found on administrative structures; roles and responsibilities of personnel, work scope descriptions of trades: shops and other support units: descriptions of processes for work orders and tracking of work: on-line communication means and downloadable forms and project information. Less detailed, summary information related to facilities management is presented from the web sites of Miami-Dale County Public Schools, San Diego City Schools, Durham Public Schools, Council of the Great City Schools, Wayne State University, Temple University, Harvard State University, University of Southern California, University of California, Irvine, and Iowa State University.

It was observed in the benchmarking study that the scope of services provided by the facilities management departments of the public school districts and universities are quite similar in nature to those provided by DPS FMCI. Obviously, there are differences in the ways different universities' and school districts facilities departments are organized and in the ways they utilize information technology as part of their operations. However, there appears to be excellent models out there to look at and obtain ideas which can be adopted to the operations of DPS FMCI.

It was discovered in this study that there is much more information on the Internet on the facilities management departments/operations of the universities than those of public school districts. It is clear that information technology and the Internet are used extensively in both cases in the preparation, processing and tracking of work orders. Also, the web pages of the mentioned facilities departments have been developed as excellent communication and public relations tools, which are believed to enhance their operations.

Evaluation Framework: The survey of existing information on organizational effectiveness and improvement indicated that contemporary organizations must adopt Total Quality Management (TQM) principles and techniques to succeed in their business. Hence, the factors and criteria used assessing the performance of an organization must relate to this framework.

The nationally recognized Malcolm Baldrige quality criteria focuses on:

- Leadership
- Information and Analysis
- Strategic Planning
- Customer Market Focus
- Human Resource Focus
- Process Management, and
- Business Results.

Leadership of the organization sets direction toward understanding and meeting customer needs and expectations. Senior executives must exercise personal leadership and involvement in:

- Defining the organization's customers;
- Creating and sustaining a focus on customers;
- Making a visible commitment to quality service for every customer; and
- Fostering a management system to guide the organization's efforts to improve its delivery of service.

Senior executives must show commitment to partnership and cooperation with employees, customers, suppliers and other organizations in the community at large.

Information and Analysis establishes measures and information systems to determine how the organization is doing.

The use and management of valid data and information is essential to improving the organization's overall performance. The information and data analysis systems must be adequate to enhance the organization's focus on customers, and to support improvement of products, programs, services and human resources.

Strategic Planning and Quality reflects the organization's direction, and quality initiatives and plans on how to meet and exceed the goals that are set. Relevant elements are:

- The organization's planning process;
- The organization's short and long-term plans;
- How the organization integrates key quality requirements into overall organizational planning; and
- How quality and performance requirements are understood and achieved in all work units.

Human Resource Management and Development ensures that employees understand, have the skills necessary, and can work in a safe and healthy environment to meet customer needs. This covers:

- The effectiveness of the organization's efforts to develop and realize the full potential of the workforce including management; and
- The organization's efforts to maintain a work environment conducive to full participation, empowerment, personal and organizational growth, cooperation between management and the workforce, and personal accountability.

Management of Processes and Quality Systems is put in place to ensure products, programs, and services are "top quality" time after time. The systematic processes used by the organization to pursue higher product, program and service quality and overall performance encompass:

- Designing and developing new programs, services and products;
- Managing and continuously improving financial processes, support processes, and the quality of suppliers' products and services; and
- Regularly assessing systems, processes, products, programs and services.

Quality and Operational Results are managed so the organization can deliver ever-improving results. The organization's current levels of product, program and service quality and improvement trends (over the past few years) must address :

- Overall operational performance in terms of productivity, efficiency, and effectiveness of each individual and department;
- Supplier quality; and
- Current quality and performance benchmarks compared to similar service providers.

Customer Focus and Satisfaction relates to how the organization anticipates, meets and "delights" the customer. This pertains to:

- The organization's relationships with its customers who may be students in the classroom, parents, constituents in the government, citizens, intermediate service agencies;
- The organization's knowledge of and commitment to customer requirements;
- Methods to determine customer satisfaction; and
- Customer satisfaction comparisons with that of competitors or similar providers.

In further surveying the existing information in the literature we noted that the implementation of TQM techniques for organizational improvement aims at customer focus and **process improvement**. To be customer-focused, an organization must:

- Involve all its members;
- Have strong top-level commitment;
- Link its incentive system to customer satisfaction ratings;
- Empower employees to solve customer problems on the spot;
- Remain in touch with the customer base through ongoing surveys.

It is not easy to change an organization's orientation from being quantity-driven to being customer-focused. Doing so requires changing the corporate culture and teaching every employee to be customer-focused. The first step in reorienting an organization toward its customers is to have all employees view the work they do as a series of processes. The goal of each process must be total customer satisfaction. Everyone in the organization is responsible for establishing a system to define and assess the critical processes that make their job run smoothly. Once employees understand the critical processes, they embark on a never-ending journey of process standardization, continuous improvement, and re-standardization of improvements in the process. It is believed that if all members of an organization constantly work to improve their process elements in a systematic and focused manner, they will lead the organization closer and closer to perfection.

Managers are the motivators or the de-motivators in directing the organization toward reengineering by the management style they choose to behave by. Therefore structuring an organization to manage quality efficiently should be the primary focus of any organization's leader. The framework includes identifying critical processes that recognize the following:

- Managing is a process.
- The old process may not be working anymore.
- The patterns of behavior that supported the old process have to change.

There are seven behavior patterns a new-style manager must possess:

1. Rather than hiding or avoiding problems, the manager must actively seek to know the parts of all processes that are not working so the parts can be fixed or improved.
2. When a problem emerges, the modern manager must look first for problems in the process, not with the people.
3. The new style manager must bring the process co-operators to the table to solve problems, rather than assuming the role as the sole or primary problem-solver.
4. Making decisions solely on "guts" must no longer be admired by the new manager; rather, the gut must be verified with data.
5. Continuous process improvement is the norm for the new style manager.
6. The manager improves processes to improve results.
7. The modern manager's reviews are frequent, educational, and supportive.

Once the management style is directed in the right way, the organization is shifted to an improvement mode much more easily.

Here is some additional implementation issues:

- **The discipline of information**. TQM people always want to see the data, and they want it to be public data, up on the shop or office wall. "If you're serious about improving quality" they say, "everybody has to know how they're doing". Customers need to be systematically surveyed, and interviewed for suggestions.

- **Eliminate rework**. An aim of all this attention to work processes is to eliminate the "scrap, waste, and complexity" from a system. The motto is "Simplify, standardize, get it right the first time". The time spent on fixing earlier mistakes (rework), in useless work that has to be done over (scrap), and in extra steps that add no value to a product or service (complexity) can be as much as 20 percent of all costs. Service organizations can have an even greater problem.

- **Teamwork**. From top management down, within units and across functions, quality issues are attacked in teams. "Teams" are not the traditional committees; they are "self-directed work groups" with their own required competencies and protocols. Unlike committees, teams are not necessarily "representative"; they bring together

most or all of the people who work in a process to work on its improvement. In TQM all persons must share the responsibility for the processes they work with; this achieves "team learning."

- **Empowering people**. Eighty-five percent of all problems in a project are traceable to the processes; just 15 percent to the people in them. TQM empowers people by advocating trust in all employees to act responsibly and by giving them appropriate authority. People want to do the right things. The task of managers is to remove the system barriers that prevent people from doing so. In TQM, work processes are best reviewed by the people closest to the processes, by those who do the work.

- **Training and recognition**. So that all employees can understand the corporate vision of quality, have the skills of teamwork and problem solving they need, and relate more effectively to customers, TQM organizations invest heavily in human resource development. Personnel systems in TQM companies rely less on incentives and rewards directed at the individual than on team-oriented "recognition, honors, and celebration."

- **Leadership**. To achieve all of the above, TQM partisans want fewer managers, at least of the old type, i.e. powerful figures in sole command of vertical authority structures. Instead, they want leaders, and of a new type- vision-givers, listeners, team-workers, committed to quality and customer needs, avid but patient (for long-term ends), orchestrators and enablers of people-driven improvement.

In addition to the information elicited from the Internet and literature, input was sought out from key DPS personnel in regard to measures of the Service Center's success. It became readily evident that the best measure of successful performance by the trades and the related service units was **customer satisfaction**. There was strong consensus on the notion that if no complaint was received from the school principals and the operating engineers after a repair or maintenance service work was completed, this would be the best indication of a successful job. It was observed that response time to service calls was obviously an important component of customer satisfaction. Effectiveness of **communications** between the Service Center and the customers (schools) and between the trades themselves were noted as an additional area of concern needing assessment.

Our interviews with DPS personnel confirmed that the **processes** involved in the operation of the Service Center is a significant part of what determines its success.
These processes include:

- The administrative structure of the Center;
- Roles and responsibilities of all of the units and personnel involved in the operations;
- Interactions / communications between the personnel and the internal and external units;
- Work procedures and their documentation;
- Budgeting and financial aspects;
- Project management;

- Human resources development and management;
- Training;
- Utilization of technology resources (computers and the Internet); and
- Mechanisms for obtaining customer feedback.

It should be recognized that all of the parameters discussed in the foregoing paragraphs of this section must be included in a framework adopted for the evaluation of the Service Center's efficacy and performance.

Evaluations: The information collected in the Baseline and Benchmarking studies as well as from the input received from the interviews were analyzed to evaluate the effectiveness of the functions and operations of the Service Center. Presented below are our evaluations:

1. The hierarchical administrative structures of DPS FMCI Department and the Building Repair Unit (BRU) were described in general terms in our Progress Report #1 – Task A: Baseline Study. The administrative structure of the BRU was presented in Exhibit II of Progress Report #1. In the present situation, Program Supervisor (PS), who reports to the Executive Director of FMCI, is in charge and there are experienced foremen under him serving as assistant program supervisors (APS); however, this structure has not been formalized. These personnel are mainly involved in project coordination.

2. The PS states that the mission of BRU is to insure that the facilities and auxiliary buildings in the DPS system receive good quality, expeditious and efficient repair services. He defines his role and responsibility as being the manager and coordinator of all relevant activities, which are directed toward customer satisfaction. The PS recognizes that customers are both external and internal, categorized as follows:

External Customers: Schools; school principals and other administrators; operating engineers and other staff; students; parents; and neighboring communities.

Internal Customers: Program manager; program supervisors; trades people; and other staff.

It was observed that the PS appeared to be involved with too many tasks in a hands-on fashion, leading to an overload situation.

3. The BRU personnel are clearly aware of their work scope and responsibilities; however, documentation of relevant information is presently lacking. In order to alleviate this shortcoming, it was decided first to establish a directory of all personnel working in the Willis Warehouse facility (Service Center). An information survey was prepared and distributed to all possible BRU personnel, with assistance from the PS's secretary. Through this survey we were able to generate a database containing the name, division, department, job title, and telephone number of the participating employees. E-mail addresses were also requested, but the response to this request was weak. This

information was supplemented by the existing but fragmented directory information availed by the secretary. Since many of the employees were not reachable at Willis Warehouse on any given day due to remote job assignments at the various DPS facilities, or due to absences otherwise, we were not able to obtain information on everybody, which makes this data base a partial directory. This directory appears in Exhibit VII in its present form. It is hoped that this work will be completed by Building Repair Unit in the future. Outside the job titles, no written documentation of the job activities and responsibilities for trades and related personnel could be found in the BRU files. Consequently, using the information obtained from the Benchmark Study (see Progress Report #2), we generated a listing of possible work scope and job responsibilities for the trades and distributed these lists to foremen / subforemen for them to go over the list and add, subtract and modify the list to bring it in line with the actual situation for their trades at BRU. The final forms of these lists are provided in Exhibit VIII. Based on our interviews, we understood that from the hierarchical perspective, trade foremen serve as working supervisors on the job. Subforemen work with foremen in estimating the projects and supervising the work of the tradesmen (journeymen).

4. The interactions between the different units of the Service Center are illustrated in Exhibit IX, which we developed based on our interviews with various DPS personnel. This Flow Chart of Service Center Operations shows that work requests from schools normally first come to SRD; a work order number is assigned to the request and it is forwarded to the trades. The trades estimate and subsequently perform the work, providing the service requested by the schools. The PS is involved in this process because he must authorize all work orders and procurements associated with the work. He may also be in a position, at times, to answer questions from superiors as well as the schools regarding the status of work orders. The Service Call software is utilized in the documentation and tracking of the work as previously described in Progress Report #1. If work requests from schools are received manually by the trades, the trade foreman sends it to SRD to obtain a work order number. Feedback from schools on work status and satisfaction can be provided to SRD, or informally to the PS, or sometimes directly to the trade foremen. If the work has not been done properly (to the satisfaction of the school principal or operating engineer), usually the same crew which performed the initial work is sent back to the school for corrective rework. In performing their work, trades receive support from the shops (shop stock, machine shop, lock shop), from the Facilities Design and Construction (FD&C) Unit of DPS FMCI, and from outside vendors, as needed. The shops accommodate, gather and produce the materials and instruments needed for the work. The FD&C Unit, which is staffed with electrical, mechanical and civil engineers, architects and landscape specialists, works with the BRU, and coordinates and consults the work for the trades, as needed. Outside vendors (contractors and suppliers) are brought in for additional support (goods and services) where needed. The assistant program supervisors (APS) and the Planning/Scheduling (P/S) Unit serve as coordinators especially when the work involves multiple trades. The P/S Unit is informed of the work orders (usually via Service Call software) work orders in order to be able to track them.

5. Besides the electronic documentation provided by the Service Call software, a variety of forms are used by the trades and other units of the Service Center. Representative

copies of these forms are presented in Exhibit IV through Exhibit XII, and are briefly described below:

Exhibit X – Work Request Form: This is a form used manually to supplement the electronic requests sent to SRD. It describes the work to be performed by a trade department with a school name and code number, and report and request dates. This form is used to work in requests by the trades to record and obtain a work request number from SRD.

Exhibit XI – Requisition Form for Goods and Services: This form is used by the trades when they need to use outside vendors for materials or services. Based on the description and justification of the need, this form is signed by the trade foreman, and approved by the BRU PS and the Executive Director or Deputy Superintendent of DPS FMCI.

Exhibit XII – DPS BRU Daily Time Sheet and Labor Distribution: This typifies the forms furnished by the trades to the BRU PS to facilitate the tracking of particular work order or a group of work orders. As shown, it documents the job site; personnel assigned; job number; estimated time (hours) for the job; daily time allocations for personnel; actual time (hours) worked; and the percentage of completion of a particular job on a given date. This computer-generated form is reported and signed by the personnel responsible for the job.

Exhibit XIII – Biweekly Status Report Form: This form is an extension of the one presented in Exhibit VI, giving starting and ending dates of the completed jobs, and the percentages of completion, for a two-week period. A useful feature of this form is the status report on materials acquisition (the Goods and Service Sheet column). This information is reported to the PS and/or assistant program supervisors by the trade foremen.

Exhibit XIV – (Project) Completion Form: This computerized form complements the Service Call System in reporting project completions. It has information on school; start and finish dates; trade; total man hours and labor costs; number and names of men assigned to the job; supervisor's name; and signatures of the reporting (trade) personnel and foreman.

Exhibit XV – Daily Time Sheet Labor Distribution Form: This form is a summary of how many hours (or people) have been allocated to the schools by each trade for a particular time period. It is used by the P/S Unit to keep track of resource allocations and to assist their coordination functions

Exhibit XVI – Daily (Take-off) Report: This is a form used by the P/S Unit to keep track of progress made by the various trades for a particular job at a school.

Exhibit XVII – Summary Take-off Sheet: This is an extension of the previous form presented in Exhibit X to track the progress of the trades in a particular job.

Exhibit XVIII - Classroom Needs Assessment Form: This is used by the P/S Unit to assess needs for preventative maintenance works in schools.

These forms constitute useful supplements to the Service Call software to facilitate the operations of the Service Center; however, many of them have not been standardized for uniform utilization across the board.

6. Our interviews indicated that the trades are satisfied with their work environment as long as there are no interruptions (by superiors) and unrealistic demands by the schools that they service. It is our understanding that it is not unusual for them to be drawn to a different project upon the request of DPS FMCI leadership, while they are in the middle of a project. This apparently occurs when the schools directly contact the upper management. Also, they might face demands for extra (unplanned and newly requested) work from the schools while they are on the job performing the original work order. Since a significant number of the DPS buildings and their equipment are fairly old, what starts as a repair job might end up as a full reconstruction, replacement, or reinstallation project. These factors upset the estimating and scheduling functions and cause delays and conflicts.

7. Our study has revealed that the Shop Stock is not fully efficient which also causes problems of delays. There are a variety of schools in the DPS district and their age and architecture (building systems, materials, equipment, etc.) vary considerably. Consequently, it is impossible for the Shop Stock to be able to hold all of the items needed for maintenance and repair work in the system. This necessitates purchases from outside vendors.

8. The trades, as well as the operating engineers, are bothered by the cumbersome paper work associated with purchasing, which has multiple steps:

- Trades generate the sheet for purchasing.
- BRU PS signs it.
- DPS FMCI executive director signs it.
- Then the form goes to DPS Fiscal Control Department.
- FCD creates a Request Purchase Order.
- The RPO is electronically processed through the Purchasing Department.
- After these steps, RPO becomes PO, indicating final approval.

As these steps take a long time, the trades might unofficially place the order, for supplies from the vendors, so by the time the PO is approved, they have the supplies ready for use. In certain cases, the work may even be completed (using the purchased materials) before the PO is approved (Note that no approvals/signatures are needed to start work on a project). In certain other cases, the trades might be tempted to create their own "stock" with excess materials left over from the previous jobs and they use these materials on new projects while waiting for the PO processing and approval. In the past, general foremen used to be given $300/month allowance for use in emergency repairs. This has been discontinued. It has been stated that presently some foremen use their own money

for emergency purchases and ask for reimbursement later. It has also been indicated that some schools purchase the supplies for the trades in order to expedite the work.

9. There appears to be some confusion on the part of the school principals regarding the difference between an alteration request and a maintenance request. Whereas the former is a local school responsibility, the latter is central responsibility. Some principals might not be able to distinguish these two types of requests and call the SRD for both. This delays the whole process and creates conflicts. On the other hand, maintenance, and sometimes certain types of repair work, might be done by the operating engineers and custodians assigned to the schools.

10. During the school year, emergencies primarily dictate the trades' schedule. The approach usually taken is to first go the site to isolate the problem if there is a safety and health danger involved in the situation. After isolating the urgent problem, the request is dealt with after the purchase-ordered material becomes available. Systematic criteria are not available for distinguishing emergencies and prioritizing the work on this basis. In the summer time, when the schools are not in session, attention is directed mostly to preventative maintenance work, which can be performed more routinely as scheduled by the P/S Unit.

11. In the summer of 1999, a major maintenance and repair program was undertaken by DPS addressing the deferred maintenance needs of all of the schools in the district. The priorities were:

- Lavatory repairs; and
- Classroom repairs (ceiling, lightning, painting, chalkboards, floors, windows).

Under the direction and coordination of an external program management firm, and with support provided by a number of corporate partners in the community, highly successful results were obtained in preparing the schools for the new academic year. BRU contributed a part of its workforce to this effort by mobilizing teams comprised of carpenters, plumbers, painters, electricians, sheet metal workers, plasterers and laborers. An important aspect of this summer project was that the BRU PS was given open purchase orders to expedite the work.

12. The importance of effective communications has been emphasized by all DPS personnel interviewed. Meetings appear to be the predominant means of communications. The PS participates in weekly meetings with the upper management, and holds weekly meetings with general foremen. There have been monthly meetings between the DPS FMCI leadership and the school principals. Foremen and tradesman communicate daily on the details of the work being performed. Communications between the different trades have been generally weak and unstructured. Besides the forms filled out by the trades and the P/S Unit, and informal communications (usually in person or by telephone), feedback mechanisms for customer satisfaction (from schools to the trades) is not well organized. It has been pointed out that the operating engineers consider it desirable to communicate with BRU staff who are knowledgeable about the work to ensure efficient service.

13. Within the bounds of this study, our overall observation is that the tradesmen in the BRU system are mostly skilled and appear dedicated to doing a good job in their work From the customers' (schools') perspective, the work product of the tradesmen are considered generally satisfactory, except for the long response time it takes to get to the jobs and to complete them.

14. Staffing of the BRU trades and other personnel is controlled by the DPS Human Resources Department. Hiring of new personnel can not be decided by the BRU PS even when there are concentrated needs for seasonal labor. Lack of adequate workforce slows down the maintenance and repair services. In addition, the number of tradesmen at BRU has gotten smaller over the years, decreasing the unit's capacity to fully meet the work demand.

15. There have not been any organized departmental training programs for the trades to upgrade their skills. It is left to the general foremen to provide the necessary training to their crew. It has been indicated that the tradesmen do not use any blue prints and other design/construction documents on many of their projects (of significant complexity).The foremen, themselves, have recently participated in a leadership and management training program offered by Wayne State University. The same program was also offered to the FD&C personnel. Another training program is currently under way on PRIMAVERA scheduling for the FD&C group and the P/S personnel.

16. The use of information technology is well received by the BRU personnel and is supported by the schools. The central component of this effort is the Service Call software, which links the providers of the services (trades) with the users (schools). The development and installation of the network, which will make this system fully operational between the Schools Center, BRU and the schools, is still in process. The links between SRD and the trades are complete; however, some trades still appear to favor manual forms over the electronic media. At present time, only a limited number of schools are electronically linked to BRU through this network. Significant improvements in communications and services should be expected to take place upon full implementation of the Service Call software.

RECOMMENDATIONS

Based upon the foregoing findings and evaluations, we would like to advance the following recommendations in regard to the improvement of the functions and operations of the DPS FMCI Service Center:

1. We first and foremost recommend that BRU adopt a Total Quality Management framework in providing its services. The two main aspects of this system are: (a) customer service; and (b) process improvement. Our study showed that the two are closely interrelated. Consequently, we recommend an integrated approach aimed at improving customer service by improving the processes which affect customer service. This must be done in a continual mode.

2. The key parameter affecting customer satisfaction is the length of time it takes by the BRU trades to respond to the schools' service requests. This response time is affected by a number of factors and processes, which have been identified and documented through this study. It is recommended that these factors and processes be analyzed in depth with a view towards correcting the deficiencies and imparting relevant modifications to increase the Service Center's productivity. Upper management commitment and support, and full participation by the BRU personnel in this effort is a prerequisite to achieving successful results.

3. Based on our observations on and evaluations of the present situation at BRU, we recommend the following actions:

- The administrative structure of the BRU should be reorganized to make the PS position more executive - and less operations - oriented. We believe that the DPS district will be best served if the PS moves into the role of a strategic planner, organizer and coordinator of BRU's activities. He could direct his attention to strategic planning and goal setting, policy matters, process improvements, human resources development (mentoring, training, teamwork), technology infrastructure development, and working with and under the leadership of the DPS FMCI senior management, to move the organization forward. The day-to-day operational oversight and coordination responsibilities can be delegated to assistant program supervisors whose roles and responsibilities should be distinct, with minimal overlap with each other and with other personnel in the system. The determination of the number and specific responsibilities of the assistant supervisors will take additional consideration and deliberation by BRU.

- The roles and responsibilities of personnel in the P/S Unit should be better defined. They should receive additional training on modern scheduling techniques and be linked with SRD to assist in the prioritization of responses to service requests. Their role in the system should also be distinct and should not duplicate the work of any other group.

- The Shop Stock should be upgraded to be able to better provide the variety and quantities of the supplies needed by the trades. The current purchasing procedures should be streamlined to remove the impediments for quick response to service calls.

- All of the forms used by the BRU personnel for manual work order processing and record keeping should be examined for possible modification, improvement, consolidation or elimination. Development of additional forms should be considered if such forms are deemed necessary for the improvement of the Service Center's functions and operations. All forms should be computerized so they can be used electronically, as well as manually in hard-copy form. It would be highly desirable to integrate the forms with the Service Call system for maximum efficiency.

- BRU should take a critical look at its work force needs in terms of the numbers and mix of skilled tradesmen and support personnel. Strategic and tactical plans should be developed to address the human resource development, recruitment and retention issues in light of the expected future service demands.

- Training efforts for all BRU personnel should be organized and expanded. Specific training needs should be identified and the necessary programs should be set up for implementation. The training programs should address: Upgrading of job skills, integrative (leadership) skills, use of information technology, and TQM principles and implementation techniques.

- Efforts should be intensified and the necessary forces should be mobilized to fully implement the Service Call networked between the trades, schools and SRD. This will improve communications, the efficiency of tracking job progress, and the customer feedback delivery system.

- Communications should be improved at all levels; between BRU and the schools, between BRU and other DPS/FMCI units, and between the trades, using all possible means (meetings, memoranda, newsletters, e-mail, etc.). The schools should be kept up to date on the (continually improving) operational system, policies, and procedures of the Service Center to equip them with a clear understanding of the differences between alteration work, preventative maintenance, corrective maintenance and emergency repair work. It should be emphasized that service calls should be directed exclusively to SRD.

- The personnel directory started in this study (Exhibit I) should be completed and the work scope descriptions of the various BRU trade departments, shops and other DPS support units (Exhibit IV through XII) should be refined and documented. We recommend that BRU develop a web site (in concert with DPS FMCI) which displays information on administrative hierarchy, a complete directory and roles and responsibilities of personnel, work scope descriptions, project information, etc. The information that could be placed on this web site has been mostly gathered in this study, and excellent models for school district facilities department web sites have been identified (See Progress Report #2). This web site proposed for BRU could also provide the means for on-line communications internally (within the DPS system) and externally (with outside entities). The integration of the Service Call functions with this web site is highly desirable and its implementation should be given serious consideration.

REFERENCES

- **TQM Reaches the Academy**
  By Ted Marchese, American Association for Higher Education Bulletin, November 1991

- **Organizational Impact of Introducing Concurrent Engineering**
  By Ellen R. Domb, Robert C. Culver, and Richard H. Rawcliffe

- **Total Quality Management**
  By Harry Costin, Dryden Press 1994

- **Quality Performance Evaluation (QPE) Program**
  http://www.qlsi.com/qpe_program.htm

EXHIBITS

EXHIBIT I

DETROIT PUBLIC SCHOOLS

DEPARTMENT OF FACILITIES MANAGEMENT & CAPITAL IMPROVEMENTS

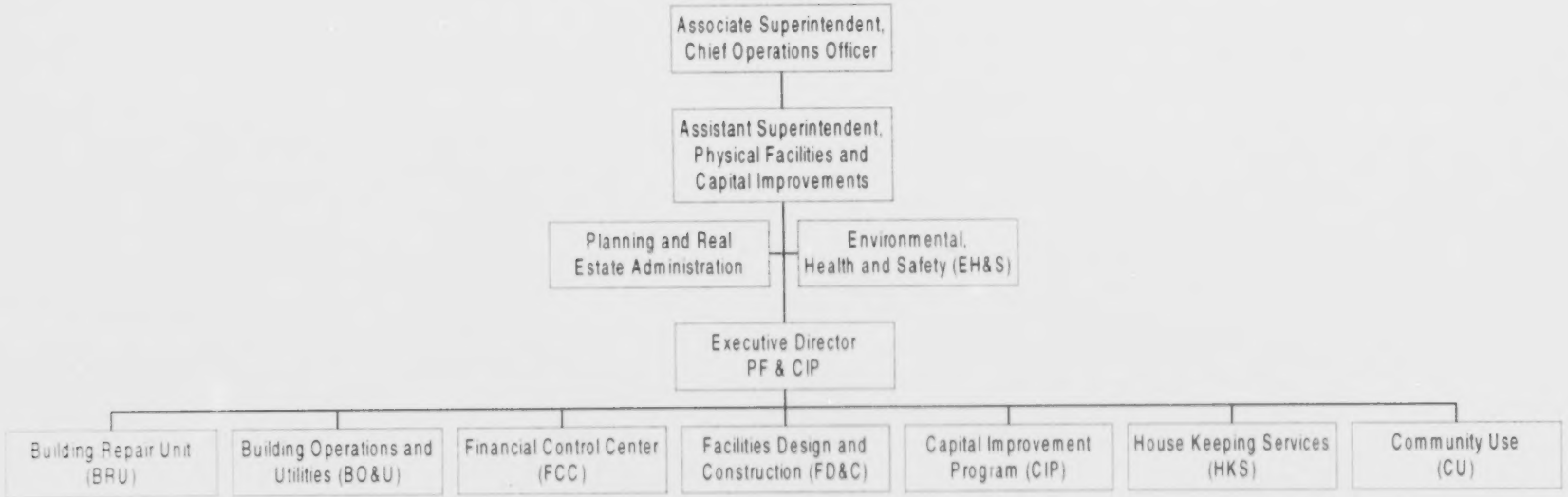
Associate Superintendent, Chief Operations Officer
Assistant Superintendent, Physical Facilities and Capital Improvements
Planning and Real Estate Administration
Environmental, Health and Safety (EH&S)
Executive Director PF & CIP
Building Repair Unit (BRU)
Building Operations and Utilities (BO&U)
Financial Control Center (FCC)
Facilities Design and Construction (FD&C)
Capital Improvement Program (CIP)
House Keeping Services (HKS)
Community Use (CU)

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EXHIBIT II

Building Repair Unit

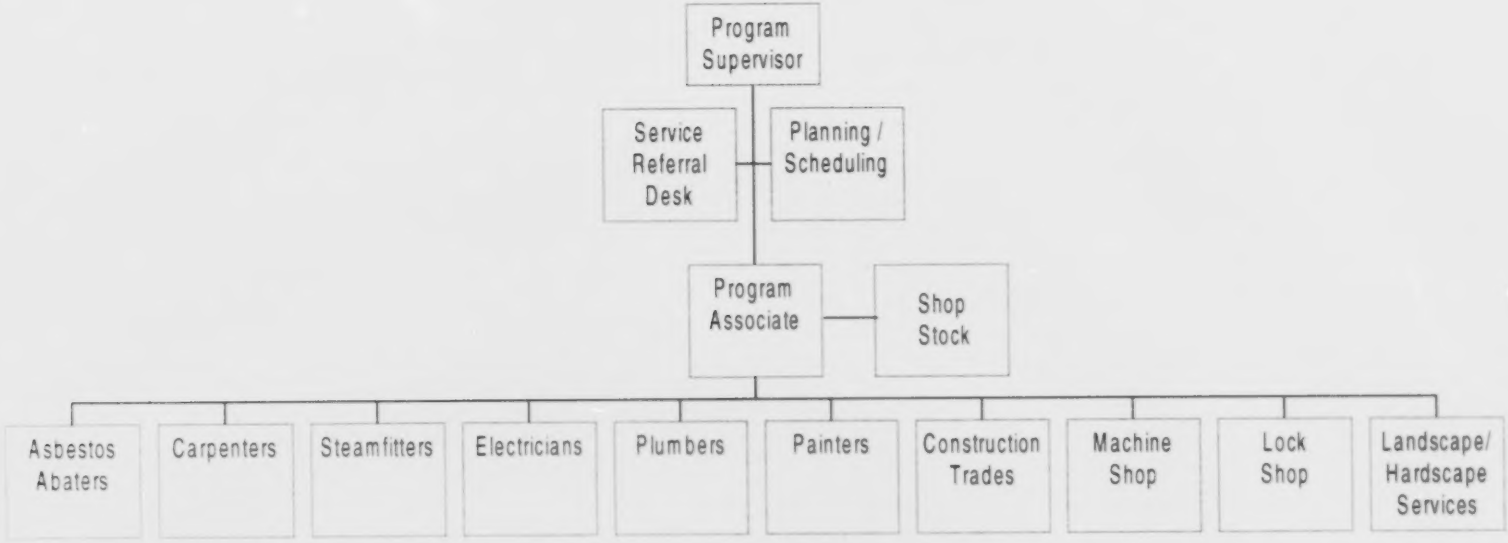

EXHIBIT III

COPY — Work Order — COPY

DPS - Facilities Service Ctr | Work Order # 401 | December 7, 1998

Reported : 8/26/98 | Assigned : 10/15/98 | Due : 7/6/98
Priority : | Estimated Hours : 2,800.00

Contact :	PRIN-072	Di Irio, Louis, Principal, Courville School	866-3000
Type :	EMERGENCY	EMERGENCY	
Location :	072 COURVILL	COURVILLE ELEMANTARY SCHOOL	
Room :			
Trade :	PAINTING	DEVERS, LEE-GF-PAINTING DEPT.	
Asset :			
Account :			
Checklist :			
Project :	PAINTING	PAINTING REPAIRS	
User Defined 1 :	Hampton C.	Facilities Service Center	
User Defined 2 :	Rq 8 Conf 128336		

Workers Assigned

Worker		Scheduled Hours	Hours Worked	Date Completed	Rate	Cost
A.Harden	Arron . Harden	0.00	324.00		R	$6,480.00
D.Dewolf	Dale . Dewolf	0.00	324.00		R	$6,480.00
G.Marchionda	George . Marchionda	0.00	324.00		R	$6,480.00
I.Morrow	Isaac . Morrow	2,800.00	324.00	10/15/98	R	$6,480.00
J.Lewis	Joel . Lewis	0.00	324.00		R	$6,480.00
J.Sames	John . Sames	0.00	324.00		R	$6,480.00
L.Gino	Lenny . Gino	0.00	324.00		R	$6,480.00
T.Graham	Timothy . Graham	0.00	324.00		R	$6,480.00
				Total		$51,840.00

Inventory

Other Costs

Item	Description	Total Cost
1	wh flat 38/5's	$1,691.00
2	wh semi 36/5's	$1,710.00
3	safety blue 20/1's	$247.00
4	safety yellow 20/1's	$287.00
5	safety orange 20/1's	$297.00
6	safety green 20/1's	$237.00
7	safety red 20/1's	$225.00
8	lambswool covers 48 pcs	$288.00
9	Sash tool 2 1/2"Penn 24 pcs	$187.00
10	ready patch 24/quarts	$116.60
	Total	$5,285.80

Problem :

COPY | Work Order | COPY

DPS - Facilities Service Ctr | Work Order # 401 | December 7, 1998

Data Completed : 10/15/98 | Current Runtime : 2,580.00

Approved By : _____ | Quality : 1

Asset Comments :

Work Performed :

Painting was completed in the following areas per Mr. DeOreo,Principal: 1st and 2nd floor halls and stairwells including all lockers.. All boys are girls lav's..Principals office..Auditorium..Had to pull off the job site several times due to emergencies. The principal was notified each time and very cooperative. Stopping work, cleaning tools moving and setting up again cost about $8,000.00 in down time that could have been eliminated with sufficant personnel to continue the assignment once it was started.

Labor :	51,840.00
Other Material :	5,285.80
Inventory :	0.00
Total :	57,125.80

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EXHIBIT IV

INTER-DEPARTMENTAL SERVICE REQUEST

BOARD OF EDUCATION SCHOOL HOUSING DIVISION

NO : 3865

REFERRED TO	SCHOOL	CODE

DATE	REQUISITION NO. ORDER NO.	WORK	CHARGE

WORK REQUESTED

Original

COMPLETED BY	COMPLETION DATE	RETURN YELLOW COPY TO

EXHIBIT V

Service Call 2.1

Introduction

OmniComp's Service Call maintenance management software.
First developed in 1985, and now in its eleventh major release, Sevice Call is used by more than 1,200 organisations.
Service Call is designed to be flexible and easy to use. Service Call's industry standard SQL data design is flexible, accessible, and very stable-as your data grows.

Service Call Features

Work Orders

The base module of Service Call includes setup files, asset tracking, corrective work orders, and preventive work orders. The core functionally of Service Call is the work order. Service Call will track work order information from initial request through close out. You can print reports to see which work orders are active, completed, and overdue. You can use predefined templates to quickly and easily create common corrective or preventive maintenance work orders.

Work Request

Enables maintenance customers throughout the facility to submit work requests directly from their computer workstations or remote sites. Requests can be reviewed by an operator or supervisor prior to becoming a Service Call work order.
Work requests are submitted via E-mail to a dedicated Service Call mailbox. A service Call user or reviewer can the open the Work Request module and can import into Service Call any new requests that have been sent to the Service Call E-mail address.
When the E-mail messages are read, the text of each is pulled into the problem description area of the work request. Service Call marks each work request with the Sender, Subject and Received date/time.
A request can be converted into a new work order, assigned to an existing work order, or no action may be taken by the reviewer.
Service Call can automatically send notification messages to the sender of the work request. Notifications alert the requester when certain work order milestones are reached, i.e, assigned work order number, scheduled completion date, change in work order status, etc. The text of these notification responses can be customized by the Service Call user.
You can view a history of all E-mail correspondence relating to a work request, such as date/time the request was read, what actions were taken and when. You can also specify the text for each response.

Inventory Tracking

Maintains records of costs and quantities for stocked inventory items. Allows items to be tagged to work orders for accurate cost accounting. Also tracks vendors and orders.

Report Writer

Report generator for designing and customizing reports and graphs. Includes a copy of Crystal Reports, plus documentation on Service Call report procedures.

Demo Data Set

Service Call contains a demo data set which you can use as you learn Service Call. When you start the program for the first time, you will be logged on to the Work Request Overview demo data set. As you create your own data sets, Service Call opens to the most recently used data set. Each time you switch data sets, you will be prompted to log on with your user code.

Generate and track corrective work orders

Service Call makes it easy to generate corrective work orders and to keep track of work order histories. You can create sliding PM schedules, generate PM work orders based on a future date, and renumber work orders.

Schedule and manage preventive maintenance tasks by date range, calendar, or run time. Service Call automatically generates preventive maintenance work orders based on your Preventive Maintenance schedule.

Service Call helps you manage because you can create dozens of powerful reports and graphs. Generate the reports to make valuable cost saving decisions. Print to screen, to a color or B/W printer, or to another file.

Keep track of the assets you maintain. Track maintenance activity by asset (such as vehicle, building, or piece of equipment). For each asset you can track multiple warranties and keep detailed property lists.

Modules :

Work Request Module allows you to use remote workstations to enter, track, and prioritize work requests, and use the requests to generate corrective work orders. Use your own E-mail system to allow requests for service to be entered, acknowledged, and provide status reports. Inventory Module helps you keep track of in-stock parts and usage rates. So you always have the parts you need when you need them. PM Library adds new checklists to your existing Service Call PM Checklist table with over 300 step-by-step preventive maintenance procedures for HVAC, electrical, plumbing, buildings, life safety, and vehicle maintenance.

Separate Modules :

Report Writer Module enables you to customize Service Call reports to fit your operation. Or use your Service Call data to create your own reports.

EXHIBIT VI

Information on Facilities Management from the Web Sites of Selected Educational Institutions

MILWAUKEE PUBLIC SCHOOLS
http://dfms.milwaukee.k12.wi.us/htm/index.htm

The division of Facilities and Maintenance Services of Milwaukee Public Schools strives for continuous improvement in their department. Searching for details in regard to the responsibilities the department assumes, it is clearly announced by the director of the services that this division offers a variety of trade and professional services to help in providing a safe and rewarding environment for students and staff of Milwaukee Public Schools. The division takes pride in doing any type of repair or construction work and having a system of immediate respond to emergency inquiries. They are also very confident of their quality work and guarantee their work to comply with applicable codes by ongoing process of training, licensing, and certifying their employees to be among the most skilled and experienced in their fields.

Some of the work they do include engineering, design, plumbing, electrical, steamfitting, painting, carpentry, masonry and any number of other services available through 26 different shops and groups. The major shops are listed following this paragraph with a brief description of their responsibilities:

- **Carpentry and Mill Shop:** Shop repairs and maintains drywall, ceilings, doors, windows, and floors. Capable of building cabinets and display cases to storage racks and shelving units, and it honors all types of custom orders. The Shop Fabricates wood and plastic laminate casework, including tables, cabinets, bookcases, carts, chairs, seats, desks, storage units, chart racks, mailboxes, office counters and shelves display, key and trophy cases doors, windows and weather-stripping .

- **Electrical Shop:** The Electrical Shop installs, repairs and maintains electrical panels, subpanels, motor control centers and service substations, lighting and power distribution systems, electrical receptacles; kitchen equipment, electrical systems for HVAC, clock and bell systems, fire alarm systems and smoke detectors, electric gates, door locks and keyless entry systems, circuit breakers, and fuses.

- **Electronics Shop** The Electronics Shop installs, repairs and maintains: Computers, fax machines, copiers, cash registers, cameras and camcorders, television sets, VCRs, Overhead, film, slide, opaque and film strip projectors, radios and walkie-talkies,

microphones and mixers, access control and video surveillance systems, phones, and local area networks (LANs).

- **Garage Shop** Virtually any type of vehicle or equipment with a gasoline or diesel engine falls under the domain of experienced mechanics in this shop. Installing brake linings, adjusting steering systems, cleaning radiators, replacing belts and changing oil are just some of the tasks performed on trucks, utility (snow plow) vehicles, end loaders, tractors, air hammer compressors, portable generators, man lifts, vans, building operations vehicles, large construction equipment and 300 other vehicles or

- **Glass Shop** Regardless of whether glass or Lexan is the preferred material for a particular project, size is no object. The Glass Shop accommodates all requests, no matter how big or small. The Glass Shop installs, repairs and replaces: clear glass, leaded glass, hammered wire glass, clear Lexan and frosted Lexan window panes, glass doors and shelves for trophy and display cases, mirrors, wired glass fire doors, glass and Lexan insets for picture frames and much more.

- **Grounds Shop** Through rain, hail, sleet and snow the ground shop makes sure the grounds of every MPS facility is safe for students and staff. From removing fallen tree limbs, salting icy walkways and mending broken fences to filling playground potholes, sodablasting graffiti and hauling construction debris, the Grounds Shop tackles a wide variety of projects everyday.

- **Insulation Shop** Called upon to provide insulation for ducts, pipes, boilers and other apparatus, the Insulation Shop functions much like a subcontractor to the Pipe/Steamfitters Shop, Plumbing Shop and Metal Shop — working collaboratively to plan and install new systems and repair existing ones. The Insulation Shop installs, repairs and maintains insulation for steam, hot water and gas heating systems, including boilers, furnaces and radiators, water meters, refrigeration, air conditioning systems, swimming pool filter septums, asbestos stage curtains, soundproofing, fire stoppage and much more.

- **Lock Shop** The shop replaces and repairs locks that become worn, old, obsolete or damaged in addition builds custom devices and appliances to secure virtually any piece of equipment from a walk-in cooler to a paper cutter — to restrict access and/or prevent injury. The Lock Shop installs, repairs, replaces and fabricates: door, window, wardrobe, cabinet and desk locks; security cables for TVs, computers and VCRs; keyless entry systems, electric strikes, padlocks, safes and vaults, mechanical lockout cylinders, and much more.

- **Machine Shop** skilled machinists in this shop fabricate parts for equipment that is no longer manufactured, or their parts cannot be purchased for equipment that is valuable and worth saving. The Machine Shop assists in the repair of and provides parts and machining for kitchen equipment, dishwashers, ovens, steam, garbage disposals, bun rollers, food conveyors, mixers, saws, HVAC and univent fans,

hydraulic and traction elevators, wheel chair lifts, and virtually any obsolete equipment

- **Mason Shop** The Mason Shop constructs, repairs and maintains brick walls and walkways, concrete block walls, parapet walls, retaining walls, glass block windows, walls and wall partitions, boiler refractories, chimneys, ceramic tile floors, walls, countertops and other surfaces, terrazzo floors, swimming pool interior walls and surrounding floors, decorative ceramic tile, ceramic art kilns, foundry and heat furnaces, masonry structures and stone structures.

- **Metal Shop** The Metal Shop fabricates, installs and repairs metal railings, gates and cages, posts, ducts, hoods and hangers, boiler breeching, including catwalks and ladders, furnaces, lockers, doors, window screens and guards, roof, downspout and gutter flashings, kitchen equipment, shelves, snow plow blades, and etc... The Metal Shop also provides welding services, testing, balancing and adjusting services for heating, ventilating and air conditioning systems. stainless steel repair, and blacksmith services.

- **Paint and Plaster Shop** applies paints, sealants, stains, varnishes, coatings and/or other finishes to interior and exterior walls, doors and window frames, furniture, display and trophy cases, chalkboards, gym and tot lot equipment, gym, wood and tile floors, ceiling/acoustical tiles, graffiti, swimming pool interiors, lockers, interior and exterior wood, metal, brick, drywall, plaster, cement, enamel, concrete, plastic and vinyl surfaces. The Paint and Plaster Shop also installs and repairs: walls, ceilings and other surfaces, ornamental and spray plaster, and drywall taping and finishing.

- **Pipe/Steamfitters Shop** Maintaining the proper and efficient operation of heating, ventilating and air conditioning systems (HVAC) is top priority for the Pipe/Steamfitters Shop but they also installs, repairs and maintains steam and hot water heating systems, gas and oil burners, refrigeration equipment, including freezers and coolers, perimeter radiation, air compressors, furnaces, pumps, compressor, filter dryers, thermostats, louvers, steam traps, humidifiers and dehumidifiers.

- **Plumbing Shop** The Plumbing Shop installs, repairs and maintains: potable water distribution systems, sanitary and storm waste systems, gas piping systems, swimming pool piping, filtration and control systems, water heaters and tanks, kitchen equipment. Also sump pumps, sewer ejection systems, catch basins, underground irrigation systems, faucets, soap dispensers, toilets, urinals, water closets, eyewash stations, lavatories and wash fountains floor, sink and roof drains, and much more.

- **Roofing Shop** The shop installs, repairs and maintains smooth built-up roofs, granular built-up roofs, slate roofs, shingle roofs, rubber roofs, plastic roofs, modified bitumen roofs, tile roofs, metal roofs, gravel roofs, wall waterproofing membranes, roof coatings and respond to link reports within 24 hours.

- **Shade and Carpet Shop** The Shade and Carpet Shop coordinates the installation, repair and replacement of window treatments, shades, curtains, blinds and film, wall-to-wall and area carpet, furniture upholstery, portable room dividers, projection screens and maps, wrestling and gym mats, swimming pool covers, tarps and utility covers, bags, banners and belts.

- **Small Engine Shop** The Small Engine Shop repairs and maintains: snow blowers, lawn mowers, garden tractors, weed eaters, hedge trimmers, lawn edgers, backpack blowers, sod cutters, lawn aerators, truck-mounted vacuums, trailers asphalt rollers, asphalt tampers, saws, portable generators, small portable water pumps, roof sweepers, small construction equipment, and much more.

Most of the shops have a 2 to 24 hour respond service to the work orders depending on the urgency of the task, all of the shops have a person in charge with a direct phone line and almost all have email accounts to receive messages through the internet. However, DFMS also has provides services to the schools and its vendors by supplying an Online Repair Requisition (ORR) form so anybody can request help easily and quickly through the Internet.

The Online Repair Requisition (ORR) Application designed for the Web allows MPS Staff to enter and inquire on Repair Requisitions for their site(s) and find the current status of their existing Repair Requisitions. The ORR Web Application is designed to run on any Web Browser and on any Windows-based PC or Macintosh Computer. The Repair Reqs will be released to the Shops for Review immediately after it has been completed. The FMS Shop Foremen will then review all new Repair Reqs as they come in each day, and either Issue the Tasks to complete the job to the appropriate Technicians, or Return the Repair Req. to the sender for additional information and/or corrections.

The access to ORR system is provided by FMS Information Services (IS) Dept. A 3-Step process is required to complete the entry process. And If you would like to check on the Status of an existing Repair Requisition, Work-Order, or Sub-Task, simply Click the FIND button and enter the Repair Req or Work-Order Number to search on. If there are any Sub-Tasks, you will be allowed to pick one from a list of Sub-Tasks that are displayed automatically.

To entering a new Repair Req: there are Drop-Down List-Boxes to select the options desired. Specific information can be entered in the Entry Fields including information on: Field Description, and Site where the repair is needed. Requested By Enter name of person needing the Repair/Service. Requests Estimate Does the School request an estimate from FMS? Order Classification Is this Repair an Emergency or a Regular Repair? Repair Code Reason for the Repair/Service. Location Building/Grounds Specify where in the Building or Grounds the repair is needed as a 20-char freeform text field.

MINNEAPOLIS PUBLIC SCHOOLS
http://www.mpls.k12.mn.us/facilities/

The Maintenance Division of the Facilities Department exists as a service organization for emergency situations, routine maintenance requests, program needs and remodeling. They have Trade works that include the following shops:

Carpenter Shop
Electric Shop
Grounds Maintenance
Paint/Glazing Shop,
Pjpefitting Shop
Plumbing Shop
Sheet Metal Shop
Telecommunications
District Monitoring Center

- **Carpenter Shop:** This shop is responsible for carpentry, blade sharpening, locksmithing, plastering, shade/blind Repair, bricklaying, iron Works and millwork

  Examples of "call-in" requests:
  Broken or loose chalk/cork board, basketball backboard repair, broken shades, playground equipment repair, fence, iron handrail and gate repair, door repair, minor non-asbestos floor tile repair, paper cutter repair/sharpening.

  Examples of repairs or improvements requiring a repair requisition include:
  Major plaster repair, Gym floor refinishing, Window replacement, Chimney repair, Floor tile replacement, or asbestos floor tile repair, and All key requests.

- **Electric Shop:** This shop is responsible for electrical, work, clocks, bells.

  Examples of "call-in" requests:
  Repair of permanently-installed equipment/devices, motors, fire alarms, kitchen equipment, switches, receptacles, lights, industrial arts equip., art equip., stage equip., clocks, bells.

  Examples of repairs or improvements requiring a repair requisition are:
  Repair of portable electric equipment; vacuums, scrubbers, sanders, routers, circular saws; installation of new electrical equipment/devices; new or moved receptacles and lights

- **Electronic Repair Shop & Musical Instrument Repair:** Responsibilities of this shop are electronic equipment repair, security, musical instrument repair.

  Examples of "call-in" requests:
  Repair of language labs, repair of book detectors, and scoreboards.

Examples of Repairs or Improvements Requiring a Repair Requisition:
Computers and related equipment, audio/visual equipment, all musical instruments except pianos and organs.

- **Grounds Maintenance:** Responsibilities of this shop include grounds maintenance, rubbish removal, snow plowing, pick-up and delivery of supplies & equipment, lining of fields, carpet repair and installation, minor asphalt repair, cement finishing.
Examples of "call-in" requests:
Removal of snow from bus stops, pick-up of rubbish/cardboard, trimming of brush, patching of asphalt, athletic field lining, minor carpet repair and patching.

  Examples of repairs or improvements requiring a repair requisition:
New carpet installation, asphalt installation/replacement, concrete sidewalk repair and replacement.

- **Paint/Glazing Shop:** Responsibilities of this shop are interior and exterior painting, glass repair & installation, graffiti removal, banners, signs & name tags, flag pole ropes.

  Examples of "call-in" requests:
Flagpole rope and cable repair/installation, window glass repair/replacement, graffiti removal, parking lot & playground striping; line chalkboards.

  Examples of repairs or improvements requiring a requisition:
Major interior or exterior painting, banner fabrication, sign/name tag fabrication, desktop glass fabrication.

- **Pipefitting Shop:** This shop covers heating, air conditioning; refrigeration, and the machine shop.

  Examples of "call-In" requests:
Refrigeration repair, auto shop hoist repair; lawn mower/snow blower repair, univent repair; room air conditioner repair/service.

  Examples of repairs or improvements requiring a repair requisition:
Air conditioner installation; and Health Services scale repair.

- **Plumbing Shop:** The responsibilities of this shop are plumbing; fire extinguishers; natural gas; swimming pools; building sprinkler systems.

  Examples of "call-in" requests:
Plugged sewer main; broken water main; fire sprinkler; gas smell or leak; malfunctioning toilet; toilet valves; faucets; toilet paper & towel dispenser replacement; toilet seat repair; kitchen equipment; water heater repair; repair of swimming pools and related equipment.

Examples of repairs or improvements requiring a repair requisition:
Sink installation, and water fountain/cooler installation.

- **Sheet Metal Shop:** This shop deals with sheet metal, ventilation and roofing.

  Examples of "call-in" requests:
  Ventilation problems; locker repair; toilet partition repair; roof leaks; lunchroom table repair; dust collector repair; guards; exterior metal signs.

  Examples of repairs or improvements requiring a repair requisition:
  Toilet partition installation/replacement; locker installation/replacement, metal shelving installation.

- **Telecommunications:** Responsibilities of this shop cover telephone installation & repair, public address systems; cabling for computers and televisions.

  Examples of "call-In" requests:
  Telephone system is malfunctioning, repair of outside or house telephone, P.A. system repair.

  Examples of repairs or improvements requiring a repair requisition:
  Telephone installation, telephone move or change; telephone equipment upgrade; P.A. speaker installation; computer network cabling; additional cable television jacks.

- **District Monitoring Center:** This shop's responsibilities are maintaining and scheduling of heating, air conditioning, and ventilation systems

  Examples of "call-in" requests include:
  Temperature fluctuations in building; burner repair, pump repair; no ventilation; boiler treatment.

UNIVERSITY of MICHIGAN
http://www.plant.bf.umich.edu/

The Facility Management of University of Michigan is part of the Plant Operations Division of the organization. Under the Plant Operations Division, several service branches exist in which Utilities and Maintenance Services are part of this division. The other branches include: Building Services, Grounds & Waste Management Services, Parking Services, and Transportation Services. The focus of our study will be on the services available in regards to repair and maintenance of the facilities, which are part of the Utilities and Maintenance Services division of the Plant Operations Division. However, it would be informative to know what other services are offered by the division, therefore, a very short summary is presented in regard to each section.

1) Services offered through **Building Services** are Custodial Services, Pest Management, Carpet cleaning, Upholstery Cleaning, Window Washing, and Disaster clean up for academic and administrative buildings on campus.
2) **The Grounds & Waste Management Services** division maintains campus grounds and landscaping, provides moving and trucking services, and manages waste and recycling collection.
3) **Parking Services** division administers parking programs for UM faculty/staff, retirees, students, visitor/guests, contractors/vendors, and special events; and maintains the parking lots and structures located on the Ann Arbor campus.
4) **Transportation Services** division provides automobile, truck, and both charter and campus bus services for faculty, staff, and students on University business. The division leases trucks, automobiles and passenger vans and coordinates the University Vanpool Program.
5) **Utilities and Maintenance Services** division provides building maintenance and renovations, and the daily monitoring and operation of campus buildings and facilities. Provides for the generation, distribution, conservation, and accounting of all utilities. Remodeling and other associated services are also available on a customer pay basis.

In the case of Facility management in order for the division to provide any services a Work Orders needs to be submitted to the Plant Operations Department through Maintenance services/Plant Order Services Department where a tracking number is provided for future reference in tracking of the job. Utilities and Maintenance Services division is organized to have some Central Shops that specialize in certain jobs and tasks of repair and maintenance, but before referring to these shops requests need to go to the Zone (Bldg.) Maintenance division of the requesting party. The Utilities and Maintenance Services division also assumes the responsibility of other services and programs such as Renovation, Energy Management, Plant Engineering, and Utility Services. A brief description is provided on the responsibility of each service or program in the following paragraphs:

- **Central Shops** are trade shops that specialize in repair and maintenance of specific task. Some of the Central Shops are as follow just to name few:

Air Conditioning
Alarm Systems
Asbestos Removal
Cabinetry
Carpentry
Carpet
Ceramic Tile
Concrete
Doors and Door Hardware
Ductwork
Electrical

Electrostatic Painting
Elevator/Escalator
Eyewashers
Fire Protection Systems
Glass Repairs
Insulation
Lighting
Masonry
Painting
Plastering
Plumbing
Shelving
Signs
Steam Heating
Upholstery
Vacuum Systems
Welding
and etc…

- **Zone (Bldg.) Maintenance:** The campus is divided into seven zones with designated Zone Maintenance divisions, which serve as a front line contact to all of the Plant Operations Divisions for preventative maintenance and 24-hour emergency respond. Other responsibilities include: on site supervision, coordinate department moves, minor electrical renovations, low-temp freezer repairs - on site, and installation of shelves, bulletin boards & pictures hung.
- **Renovations:** If a job is not a repair or maintenance related task the division that sometimes would be contracted is The University of Michigan Contracting Group, which is a full service contractor equipped with the right tools and the right people to handle projects of any size. The contracting Group provides construction at competitive prices to assist in creating functional areas in offices or labs and provide quotations on any construction and renovation project.
- The University is very involved in **Energy Management** by participating in the Energy Star program to reduce energy consumption and encouraging its efficient use. There is a special division under the Utilities and Maintenance Services division to oversee the process.
- **Plant Engineering** provides engineering and technical support directly to Zone Maintenance Department. Plant Engineers are involved in renovation and new construction projects from concept to completion. They review plans through the design phase of each project and make recommendations pertaining to: Energy Efficiency, Controllability, Maintainability, Life Cycle Value, and Quality Control.
- The **Utilities Billing Systems** Team is responsible to ensure the furnish of all utilities in a safe, reliable, economic and effective manner, to accurately bill out all utilities, and to maximize the use of energy dollars. This division also controls and maintains the Power Plant owned by the University.

Now we try to take a look at a brief summary of responsibilities held by each Central Shop to see what type of trade works are done in these shops. Information is only available on certain shops, which are as follow: Air Conditioning, Cabinetry, Electric, Elevator, Key Office, Masonry, Paint, Plumbing, Roofing, Sign, and Upholstery Shop.

Under the Air Conditioning shop there are three other branches:

1) ***Mechanical Air Conditioning & Refrigeration Shop*** is responsible for installation, operation, inspection, and maintenance of window a/c units, centrifugal chillers, reciprocating compressors & chillers, cold rooms, ultra-low temp freezers, compressed air dryers, ice machines, salad bars, pop machines, makeup air handlers & drinking fountains, water treatment & cooling tower, heating & cooling equipment for labs & buildings, and other similar equipments and machines.

2) ***Air Conditioning Controls*** which is responsible to maintain all direct digital control equipment, install direct digital control equipment, metering energy usage, and overseeing the second stage of process of Energy Conservation and Energy Star, which is Building tune-up.

3) ***Air Conditioning Systems*** provides maintenance, testing, and repair services for the following scenarios: Heating & Cooling in Labs, Offices, Workspaces, and Classrooms; Chiller Operation and Maintenance; Chilled Water Systems, Steam and Hot Water Heating Systems; HVAC Control Systems; Fume Hood and Exhaust Systems; Air Balancing; Radon Testing; Infra-Red Thermal Imaging; Eddy Current Analysis.

- **Cabinetry Shop:** Provides services such as shelving, counter tops, office furniture, mail units, reception desks, virtually all custom work of wood, plastic laminate and solid surfaces. Complete tear down of all old upholstery and examination of each piece for broken parts or loose joints. Repadding of the frame. Estimation and providing custom solutions to unusual upholstery needs.

- **Electric Shop:** Provides repair and service to any type of Electronics, Radios, Fire Systems, Elevators, Outside Lighting, Special Events Electrical, Minor Construction Electrical, Major Jobs Electrical, and HU Electrical.

- **Elevator Shop:** The intent of this shop is to to provide the University of Michigan community with reliable, safe and cost-effective vertical transportation by providing preventative maintenance and repairs with an immediate respond to any emergency situation.

- **Key Office:** Key distribution University Buildings and property; repair of Lock, hardware, door and frame repairs; Rekeying of doors, file cabinets, and desks; Planning of small and large projects; Installation of new doors and hardware; and Consultation for special hardware needs.

- **Masonry Shop:** Maintains all masonry exteriors of buildings. Repairs stress cracks, crumbling bricks and blocks, tuckpointing, foundations, ceramic tile walls and floors, concrete sidewalks and drives. Saw out and remove concrete for electrical and plumbing lines. Repair street curbs and gutters, sunken and damaged stone sewers, and interior walls.

- **Paint Shop:** Provides Glass repair and installation; Sign engraving and installation; Carpet installation; Spray painting; Furniture refinishing; Graffiti removal; Electrostatic painting; Maintenance painting; Estimates; and Exterior and interior painting.

- **Under Plumbing Shop there are three other branches:**

  1) ***Steamfitters & Pumps Operations Shop:*** Installation & maintenance of radiators, fan coils, & steam traps, steam valves, & high & low pressure steam systems; also the shop installs, repairs, & replaces vacuum pumps, chilled water pumps, sump pumps, sewage ejector pumps, and hot water heating to name a few.

  2) ***Insulation & Asbestos:*** Maintain a constant temperature of chilled water, hot and cold water pipes, and steam piping. Removal and disposal of asbestos containing materials i.e.: Floor tile, pipe insulation, ductwork, boilers, plaster, etc.

  3) ***Plumbing Systems:*** Install and repair hot & cold water piping systems, deionized water systems, natural or lab gas systems, water conditioning, and filters. Install and repair all types of sewer piping. Install and repair of fixtures, water closets, sinks, faucets, water cooled equipment, hoods, gas appliances, temperature control valves, hot water heaters & storage tanks, and black-flow preventers.

- **Roofing Department:** Repairs to any type of roof system, install of new roofs of any type, inspection service for existing roof condition, test cut information of the system, deck type and buildings roofing history. Water proofing above or below grade as well as inside building. Installation of new mechanical unit on existing roofs. Cleaning of roof drains, roof gutters, and downspouts prior to the winter season.

- **Sign Shop:** Glass repair and installation; Sign engraving and installation; Carpet installation; Spray painting; Furniture refinishing; Graffiti removal; Electrostatic painting; Maintenance painting; Estimates; and Exterior and interior painting.

- **Upholstery Shop:** Shelving, counter tops, office furniture, mail units, reception desks, virtually all custom work of wood, plastic laminate and solid surfaces. Complete tear down of all old upholstery. Examinations of each piece for broken parts or loose joints.

MIAMI-DADE COUNTY PUBLIC SCHOOLS
http://ofocentral.dade.k12.fl.us/

Miami-Dade County Schools have named their department "'Me Bureau of Facilities Operations". The web site for the department starts with the mission, goals, and the overview of the Bureau, which is followed by: General Information, Satellite Offices, BFO News, School Information, Telephone Directory, Data & Reports, Computer Support Bargaining Units and links to Miami-Dade County Public Schools. Organizational charts, procedures, forms and reports can be found on the General Information page.

SAN DIEGO CITY SCHOOLS
http://www.sdcs.k12.ca.us/facilities/Index.htm/

The web site of the Facilities Development Department at San Diego City Schools gives recent information about the department and the directory and responsibilities of its personnel. The department is divided into 3 units: Land and Facilities Planning, Architecture, and Construction Management. Each of these groups provides specialized services individually, as well as through cross-coordination between the units. 'Me web site has a Mission/Vision/Values statement, and a 'who to call' section. There is updated information which can be found on a "Latest Facts" page. San Diego City Schools also has a separate Facilities Planning Department which is responsible for school boundaries, enrollment figures, and long- and short- range facilities planning.

DURHAM PUBLIC SCHOOLS
http://www.facilities.durham.k12.nc.us/

The Durham Public Schools Facilities Department characterizes its web site as the entry point into their collection of information for employees and the public-at-large who may be interested in the department. Departmental Overview, Service Desk Numbers, After Hours Emergency Service, Maintenance and Repairs Handling Request for Repairs, Emergency Service Request, Urgent Service Request, Routine Service Request, Preventative Maintenance, Elective Maintenance, Alterations and Remodeling, Noise Control, Keys and Locks, Pest Control, Transportation, Custodial Operations, Grounds Maintenance, Recycling Refuse Collection Services, Disposal of Hazardous Wastes, Utilities and Energy Management, Clean School Incentive, After Hour Heating and Air Conditioning, Playgrounds, New Construction, Real Estate, and Frequently Asked Questions are the available information links on the web site. In addition, on the Public Information page, one can find additional links to schools' home pages, and information about the state and a guide to how to access information about the Facilities Department.

COUNCIL OF THE GREAT CITY SCHOOLS
http://www.cgcs.org/

As an organization of the nation's largest urban school systems, advocating K-12 education in inner-city schools, and governed by superintendents and board of education

members from 50 cities across the country, the Council of the Great City Schools has a web site which disseminates information about the council and its members. Some of the headlines (links) on this web site are: What's New, On-line News, Upcoming Conferences, About the Council, Reports and Data, Council Resources, Council Initiatives & Partnerships, and Management Services. Under "About the Council", a visitor can find information about the organization, and get links to the web sites of the individual Council Member Districts, where it is possible to search for information about facilities management and many other topics.

WAYNE STATE UNIVERSITY
http://www.facilities.wayne.edu/

Wayne State University's Facilities, Planning and Management site is one the most complete sites available on the Internet for external users' view and exploration. The page consists of several links that would take the visitor anywhere from finding information on Business Services to Who's Who. Information is found on issues such as: Business Services, Contracting & Construction Services, Custodial Services, Design Services, Ground Services, Plant Operations & Maintenance, Energy Management, Dirt & Dust Report, Cleaning Request, Lightning Request, Work Request, and other Facilities Services. For example, under the Business Services, a visitor can fuid necessary information on how and who to contact in order to get help on any of the following issues: Customer Purchases, Customer Billing, Systems Support, Materials Inventory, Stockroom Office, Job Audits/Refunds, Labor Data Entry, Plant Fund Accounting, Utility Bill Payments, and Secretarial Support. There are also Request Forms available through the page where users can request cleaning services and other repair works.

TEMPLE UNIVERSITY
http://www.temple.edu/facilities/

The Facilities Management site of Temple University is an excellent source on how to present information in regard to services offered by the department. Although the site does not go into major detail on each aspect of the department, enough information is presented to understand the organization within the establishment. On this site, a visitor can find information on who to contact for help and the site provides means for placing a Request for Repairs, which could be submitted by e-mail. Information available on the site are as follows: Engineering and Construction: Maintenance, Engineers, HVAC, Construction Management, Utility Generation and Distribution; Energy and Utilities Management: Corporate Energy Procurement, Monitoring, Management, Electric Generation and Central Utility Overview; Planning and Design: Corporate Physical Planning and Design Services; Health Sciences Center: Maintenance and Operation of Health Science Center Buildings; Data and Materials Management: Work Control Centers, Data Systems, Central Storerooms, Financial Data Processing and Procurement; Support Services Division: Housekeeping, Service Operations, Grounds, Transportation and Postal Operations; Fire Marshal: Corporate Fire Safety, Asbestos and Lead Paint Management, and Elevator Maintenance.

HARVARD UNIVERSITY
http://www.uos.harvard.edu/

Harvard University presents its information in a different fashion where the responsibilities are divided between two divisions: University Operations Services and Harvard Planning and Real Estate. On Harvard Planning and Real Estate a visitor can find information about: Project Management Physical Planning, Project Approvals, Residential Real Estate, University and Commercial Real Estate, and Property Information. Information regarding Facilities Management and Repair are under University Operations Services, which is divided into several different departments such as: Engineering & Utilities, Environmental Health & Safety, Facilities Maintenance Operations, Transportation Services, Administration & Finance, and Applied Technologies. Visiting the site gives the viewer a sense of how different departments work in complement to each other to perform facilities management tasks and projects and of how to request help for repair services.

UNIVERSITY OF CALIFORNIA, IRVINE
http://www.abs.uci.edu/depts/facil/

An excellent web site out of the many university facilities departments belongs to University of California, Irvine. The information given at the site aims to improve communications and the understanding of how the department functions. The site outlines the types of services available both for internal and external users. The site mostly provides information regarding the organization, mission of the department and lists of contact people, as well as the ongoing programs to improve services. To operate and maintain a high- quality environment, the site provides the information with directories and sections such as: Energy Management, Central Plant Operations, Grounds Program, Building Floor Plans, Recycling, Fleet Services Cost Reduction. In addition, the site gives updated information on: Status of Projects, Renovation Processes, Business Process Innovation, Departmental Improvement Action Plans, etc. The requests for repairs can be submitted via the Internet by downloadable forms, as well as by connecting users to relevant personnel via e-mail.

WEST VIRGINIA UNIVERSITY
http://www.wvu.edu/~facserv/

West Virginia University has named its department as "Facilities and Services" Information on the web site can be accessed through different sections. After a brief mission statement the web site links to: Environmental Health and Safety, Facilities Information System, Physical Plant, Public Safety and Transportation, Parking, Bus Service, Motor Pool and PRT Service. As an example, Environmental Health and Safety section provides information on and descriptions of programs like Accident Prevention, Asbestos, Environmental Health, etc. This web site also provides 'who is who' information and contact addresses.

MICHIGAN STATE UNIVERSITY
http://www.opb.msu.edu/

The Facilities Planning and Space Management at Michigan State University is under the Office of Planning and Budgets. Links to documents and reports related to facilities planning and space management can be reached from this site. Michigan State University uses the web not only for internal users, but 'guests' can also log on to get an idea about the departments resources and processes. The available information is classified under different titles such as: Space WebVentory, Classroom Connection, FPSM Policies & Procedures Resource Guide, Manual of Business Procedures, Alterations and Improvements of Facilities, etc. The Space WebVentory web site is designed to allow easy access to space inventory data and reports, and allows updates by registered internal users. A manual is provided for visitors to understand and use the system. Under Classroom Connection, one can submit request forms via the Internet for any given classroom. FPSM Policies & Procedures Resource Guide contains policies and general implementation procedures to execute different types of projects. In addition, project responsibilities and contact personnel information are presented at the web site.

UNIVERSITY OF SOUTHERN CALIFORNIA
http://fmsnet.usc.edu/

In support of education and research at the University of Southern California, The Facility Management Services Department has established an excellent web site containing information about the department and brief mission and vision statements. One can link to Services, Departments, Building Information, and GroupWise Email through the main site to get useful information. In regard to necessary preventative maintenance, repairs, and improvements for the USC campuses and University-owned property, the site gives brief descriptions on 'Available Services and How to Obtain Them' for: Locksmiths, Electrical, Building Services, Building Coordinators, Planning Department, Painting, Plumbing, and other trade groups. Another feature of this site is a Billing and Cost Information link, which can be further, pursued for: Routine Maintenance and Billable O&M Services, Estimates, Time and Materials, and Customer Inquiry Screens. Through another link, one can get the current organizational charts of the FMS departments. On Building Information page, there is information about the buildings and related sites, which require a login ID, and a password for access. The same password is also needed for the GroupWise e-mail since this process is only for internal users. However an external user can contact the personnel by e-mail.

IOWA STATE UNIVERSITY
http://www.fpm.iastate.edu/

Iowa State University's Facilities Planning and Management site is a good source of information regarding, the organization of and the services offered by the department. Similar to other sites, they provide a brief description of the department and people to contact in case of emergencies and for help. They also provide methods to submit requests via the Internet and encourage the use of the net in obtaining information regarding their department.

EXHIBIT VII

DPS Facilities Management / Building Repair Unit Employees Directory

(Tentative)

Department	Division	First Name	Last Name	Job Title	Phone Num.
Build. Rep. Unit	Construction Trades	Wayne	Bernard	Equipment Operator	(313) 491-4611
Build. Rep. Unit	Construction Trades	James	Embry	Equipment Operator	(313) 494-6548
Build. Rep. Unit	Construction Trades	Rickey	Forte	Asst. Gen. Foreman	(313) 494-1468
Build. Rep. Unit	Construction Trades	Robert	Murry	Gen. Foreperson	(313) 494-1468
Build. Rep. Unit	Construction Trades	Ada	Abdulla	Plasterer	(313) 343-6410
Build. Rep. Unit	Construction Trades	James	Leroy	Sub Foreman	(313) 534-8087
Build. Rep. Unit	Construction Trades	Allen	Hollins	Plasterer	(313) 313-4397
Build. Rep. Unit	Construction Trades	Charles	Muhammad	Plasterer	(313) 891-2271
Build. Rep. Unit	Construction Trades	Dupree	Morrison	Plasterer	(313) 342-1061
Build. Rep. Unit	Construction Trades	Edward	Naize	Plasterer	(313) 342-8894
Build. Rep. Unit	Construction Trades	Norman	Peters	Plasterer	(313) 897-7464
Build. Rep. Unit	Construction Trades	Allan	Rice	Plasterer	(313) 864-6010
Build. Rep. Unit	Construction Trades	Curtis	Tarrant	Plasterer	(313) 526-4342
Build. Rep. Unit	Construction Trades	Melvin	Tarrant	Plasterer	(313) 825-1756
Build. Rep. Unit	Construction Trades	Joseph	Teets	Sub Foreman	(313) 849-2984
Build. Rep. Unit	Construction Trades	Ken	Bizek	Ceramic Tile and Marble	(313) 494-1468
Build. Rep. Unit	Construction Trades	Peter	Cimarosti	Ceramic Tile and Marble	(313) 494-1468
Build. Rep. Unit	Construction Trades	Lawrence	Davis	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Ralph	Gantt	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Roosevelt	Kent	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Lament	Price	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Douglas	Miller	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Gasper	Serra	Cement Mason	(313) 494-1541
Build. Rep. Unit	Construction Trades	Bershay	Stubble Field	Cement Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Matthew	Bracey	Brick Mason	(313) 863-0924
Build. Rep. Unit	Construction Trades	Dennis	Brock	Brick Mason	(313) 601-7070
Build. Rep. Unit	Construction Trades	Kenneth	Byrdsong	Brick Mason	(313) 538-9921
Build. Rep. Unit	Construction Trades	Hosea	Chambers	Brick Mason	(313) 864-1032
Build. Rep. Unit	Construction Trades	John	Coates	Brick Mason	(313) 336-4888
Build. Rep. Unit	Construction Trades	Cornelius	Cogborn	Mason Tender	(313) 898-7912
Build. Rep. Unit	Construction Trades	James	Deguvera	Brick Mason	(313) 885-5307

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DPS Facilities Management / Building Repair Unit Employees Directory

Build. Rep. Unit	Construction Trades	Dale	Flowers	Mason Tender	(313) 514-7053
Build. Rep. Unit	Construction Trades	James	Garlit	Brick Mason-Sub Foreper.	(313) 538-9338
Build. Rep. Unit	Construction Trades	Desmond	James	Brick Mason	(313) 272-1722
Build. Rep. Unit	Construction Trades	Byron	Kearney	Brick Mason	(313) 830-1536
Build. Rep. Unit	Construction Trades	James	Mack	Brick Mason	(313) 521-4194
Build. Rep. Unit	Construction Trades	Ken	Middleton	Brick Mason	(313) 331-1727
Build. Rep. Unit	Construction Trades	Kennard	Pattaway	Brick Mason	(313) 925-1574
Build. Rep. Unit	Construction Trades	Jeffrey	Roberts	Brick Mason	(313) 255-1902
Build. Rep. Unit	Construction Trades	John	Roberts	Brick Mason	(313) 255-1902
Build. Rep. Unit	Construction Trades	Houston	Stuckey	Brick Mason	(313) 532-3098
Build. Rep. Unit	Construction Trades	Dennis	Wilson	Laborer	(313) 933-9325
Build. Rep. Unit	Construction Trades	Donald	Young	Brick Mason	(313) 494-1468
Build. Rep. Unit	Construction Trades	Keith	Averett	Roofer	(313) 494-1468
Build. Rep. Unit	Construction Trades	Gordon	Bader	Journeyman	(313) 372-4889
Build. Rep. Unit	Construction Trades	Kirk	Blaszczyk	Trade Foreman	(313) 520-4174
Build. Rep. Unit	Construction Trades	Patrick	Blaszczyk	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	Adrian	Bonds	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	George	Brewer	Sub Foreman	(313) 832-1241
Build. Rep. Unit	Construction Trades	Micheal	Buright	Roofer	(313) 507-1248
Build. Rep. Unit	Construction Trades	Robert	Daniels	Trade Foreman	(313) 835-7431
Build. Rep. Unit	Construction Trades	Donald	Fairchild	Roofer	(313) 494-1468
Build. Rep. Unit	Construction Trades	Tracy	Gordon	Roofer	(313) 494-1468
Build. Rep. Unit	Construction Trades	Kinnand	Hockenhull	Roofer	(313) 862-8182
Build. Rep. Unit	Construction Trades	Wayne	Johnson	Roofer	(313) 892-3361
Build. Rep. Unit	Construction Trades	Micheal	Krupp	Trade Foreman Roofing	(313) 494-1468
Build. Rep. Unit	Construction Trades	Robert	Lewis	Roofer	(313) 541-8632
Build. Rep. Unit	Construction Trades	James	Lezen	Roofer	(313) 775-0321
Build. Rep. Unit	Construction Trades	Eddie	Lucas	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	Marcus	Mathews	Journeyman Roofer	(313) 363-3395
Build. Rep. Unit	Construction Trades	Renaldo	Pearson	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	Richard	Ragap	Journeyman Roofer	(313) 494-1468
Build. Rep. Unit	Construction Trades	Janet	Rudolph	Apprentice	(313) 494-1541
Build. Rep. Unit	Construction Trades	Dewey	Snell	Sub Foreman	(313) 494-1468
Build. Rep. Unit	Construction Trades	Richard	Trim	Sub Foreman	(313) 494-7620

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DPS Facilities Management / Building Repair Unit Employees Directory

Build. Rep. Unit	Construction Trades	Daniel	Venegas	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	Thomas	Washington	Roofer	(313) 494-1468
Build. Rep. Unit	Construction Trades	Lorenzo	Whitaker	Journeyman	(313) 494-1541
Build. Rep. Unit	Construction Trades	Robert	Wiley	Roofer App.	(313) 867-3850
Build. Rep. Unit	Construction Trades	Robert	Murry	Journeyman	(313) 494-1468
Build. Rep. Unit	Painting/Glazing	Edgar	Armstong	Trade Foreman/Painter	(313) 494-1491
Build. Rep. Unit	Painting/Glazing	Kenneth	Chapin	Painter	(313) 430-8934
Build. Rep. Unit	Painting/Glazing	Lee	Devers	Acting.Gen.Fore.	(313) 494-1456
Build. Rep. Unit	Painting/Glazing	Martin	Gabriel	Trade Foreman/Painter	(313) 494-1491
Build. Rep. Unit	Painting/Glazing	Milton	Hall	Trade Foreman/Glazer	(313) 494-1492
Build. Rep. Unit	Painting/Glazing	Joseph	Harold	Trade Foreman/Painter	(313) 494-1493
Build. Rep. Unit	Painting/Glazing	Henry	Harris	Sub-Foreman/Painter	(313) 494-2327
Build. Rep. Unit	Painting/Glazing	John	Harris	Painter	(313) 990-5243
Build. Rep. Unit	Painting/Glazing	Sydney	Haves	Painter	(313) 431-7161
Build. Rep. Unit	Painting/Glazing	Herbie	Hunter	Trade Foreman/Glazer	(313) 494-1491
Build. Rep. Unit	Painting/Glazing	George	Marchionda	Trade Foreman/Painter	(313) 494-1491
Build. Rep. Unit	Painting/Glazing	Robert	Martin	Sub-Foreman/Glazer	(313) 494-1492
Build. Rep. Unit	Painting/Glazing	John	McCotter	Sub-Foreman/Painter/Gla.	(313) 494-1492
Build. Rep. Unit	Painting/Glazing	Guy	Stanley	Trade Foreman/Glazer	(313) 494-1491
Build. Rep. Unit	Painting/Glazing	Leonard	Thomas	Painter	(313) 990-5211
Build. Rep. Unit	Carpentary	Dennis	Baran	Sub-Foreman/Carpenter	(313) 494-2541
Build. Rep. Unit	Carpentary	Danny	Barnes	Sub-Foreman/Carpenter	(313) 494-1460
Build. Rep. Unit	Carpentary	Ronald	Bogus	Acting.Gen.Fore.	(313) 494-1460
Build. Rep. Unit	Carpentary	William	Gardner	Trade Foreman/Carpenter	(313) 494-1460
Build. Rep. Unit	Carpentary	William	Gruenwald	Trade Foreman/Carpenter	(313) 494-1460
Build. Rep. Unit	Carpentary	Noel	Jolley	Carpenter	(313) 431-9781
Build. Rep. Unit	Carpentary	James	Kuznar	Acting Asst.Gen.Foreman	(313) 494-2540
Build. Rep. Unit	Carpentary	William	Langford	Trade Foreman/Carpenter	(313) 494-1460
Build. Rep. Unit	Carpentary	Paul	Modreski	Sub-Foreman	(313) 494-1460
Build. Rep. Unit	Carpentary	Robert	Morefield	Carpenter	(313) 431-8561
Build. Rep. Unit	Carpentary	Warren	Nunlee-Bey	Carpenter	(313) 431-0118
Build. Rep. Unit	Carpentary	Thomas	Poloski	Carpenter	(313) 431-7166
Build. Rep. Unit	Carpentary	Gene	Ray	Carpenter	(313) 430-1060
Build. Rep. Unit	Carpentary	Randolph	Stevens	Trade Foreman/Carpenter	(313) 494-1463

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DPS Facilities Management / Building Repair Unit Employees Directory

Build. Rep. Unit	Carpentary	William	Young	Carpenter	(313) 431-0053
Build. Rep. Unit	Carpentary	Karl	Zarebski	Trade Foreman/Carpenter	(313) 494-2683
Build. Rep. Unit	Carpentary	Vernard	Walker	Sub-Foreman	(313) 494-2541
Build. Rep. Unit	Carpentary	John	Zielki	Carpenter	(313) 431-1179
Build. Rep. Unit	Electrical	William	Banks	Sub-Foreman	(313) 494-1470
Build. Rep. Unit	Electrical	James	Embry	Electrician	(313) 430-2964
Build. Rep. Unit	Electrical	Rodney	Foster	Electrician	(313) 990-8553
Build. Rep. Unit	Electrical	Anthony	Gibson	Sub-Foreman	(313) 494-1472
Build. Rep. Unit	Electrical	Bernard	Green	Electrician	(313) 431-8563
Build. Rep. Unit	Electrical	Robert	Huss	Electrician	(313) 431-7170
Build. Rep. Unit	Electrical	James	Kirkwood	Sub-Foreman	(313) 494-1471
Build. Rep. Unit	Electrical	William	Lett	Electrician	(313) 431-1435
Build. Rep. Unit	Electrical	Dennis	Long	Acting.Gen.Fore.	(313) 494-1359
Build. Rep. Unit	Electrical	George	Mason	Electrician	(313) 430-8932
Build. Rep. Unit	Electrical	Harold	Meiver	Trade Foreman	(313) 494-1470
Build. Rep. Unit	Electrical	David	Nunlee	Sub-Foreman	(313) 494-1470
Build. Rep. Unit	Electrical	Lawrence	Philips	Asst.Gen.Foreman	(313) 494-1470
Build. Rep. Unit	Electrical	John	Sloan	Electrician	(313) 430-7593
Build. Rep. Unit	Electrical	Philis	Turner	Electrician	(313) 431-1406
Build. Rep. Unit	Electrical	Robert	Wittla	Electrician	(313) 431-5607
Build. Rep. Unit	Plumbing	Jack	Burger	Sub-Foreman/Sewer Main.	(313) 494-1485
Build. Rep. Unit	Plumbing	Carl	Davis	Asst.Gen.Foreman	(313) 494-0392
Build. Rep. Unit	Plumbing	John	Franklin		(313) 431-3441
Build. Rep. Unit	Plumbing	Johnnie	Helms	Sub-Foreman	(313) 494-1485
Build. Rep. Unit	Plumbing	John	Kucharski		(313) 431-7169
Build. Rep. Unit	Plumbing	Larry	Redfearn	General Foreman	(313) 494-0391
Build. Rep. Unit	Plumbing	Robert	Thomas	Sub-Foreman	(313) 494-1485
Build. Rep. Unit	Plumbing	John	Vdare		(313) 431-8565
Build. Rep. Unit	Plumbing	Bernard	Willis		(313) 431-8547
Build. Rep. Unit	Plumbing	Mecoma	Grayson	Sub-Foreman	(313) 494-1485
Build. Rep. Unit	Plumbing	Hunter	Larry	Tradeforeman/Sprinklerfit.	(313) 494-1487
Build. Rep. Unit	Plumbing	Williams	Templeton	Sub-Foreman	(313) 494-1487
Build. Rep. Unit	Plumbing	Kenneth	Hendrix	Sub-Foreman	(313) 494-1485
Build. Rep. Unit	Sheet Metal	Wendald	Clark	Acting.Gen.Fore.	(313) 494-0959

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DPS Facilities Management / Building Repair Unit Employees Directory

Build. Rep. Unit	Sheet Metal	Willie	Collins	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Johnnie	Downing	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Bobby	Floyd	Sheet Metal Worker	(313) 494-0959
Build. Rep. Unit	Sheet Metal	John	Hill	Sheet Metal Worker	(313) 494-0959
Build. Rep. Unit	Sheet Metal	James	Horton	Sheet Metal Worker	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Ray	Johnston	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	George	Martin	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Richard	Pauwels	Sub-Foreman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Tory	Pearson	Sheet Metal/Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Jerry	Petrykowski	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	John	Povle	Sheet Metal	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Anton	Rozier	Sheet Metal/Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Rodney	Thompson	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Gregory	Turner	Sheet Metal/Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Scott	Watko	Journeyman	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Wesley	Williams Jr.	Sheet Metal	(313) 494-0959
Build. Rep. Unit	Sheet Metal	Samuel	Winters	Journeyman	(313) 494-0959
Build. Rep. Unit	Pipefitting	Llovd	Burgess	Sub.-Fore.Temp.Control	(313) 494-1484
Build. Rep. Unit	Pipefitting	Thomas	Cocking	Sub-Foreman/Pipefitter	(313) 494-1480
Build. Rep. Unit	Pipefitting	Samuel	Crawford	Sub-Foreman/Pipefitter	(313) 494-1481
Build. Rep. Unit	Pipefitting	Fred	Hoeft	Ass. Gen. Foreman	(313) 494-1480
Build. Rep. Unit	Pipefitting	Wayne	Fuller	Sub-Foreman/Pipe Cover	(313) 494-1480
Build. Rep. Unit	Pipefitting	Edgar	Fields		(313) 990-1875
Build. Rep. Unit	Lock Shop	Tom	Brown		(313) 431-8546
Build. Rep. Unit	Lock Shop	John	Henry		(313) 431-8561
Build. Rep. Unit	Lock Shop	Rick	Reynold		(313) 431-7160
Build. Rep. Unit	Sewer Maintainence	Mac	Grayson		(313) 990-8555
Build. Rep. Unit	Sewer Maintainence	Kenneth	Hendrix		(313) 990-2597
Build. Rep. Unit	Sewer Maintainence	Larry	Hunter		(313) 990-8554
Build. Rep. Unit	Sewer Maintainence	William	Templeton		(313) 990-5244
Build. Rep. Unit	Sewer Maintainence	Art	Wiggins		(313) 990-5245
Build. Rep. Unit	Machine Shop	Tom	Rymiszewski		(313) 494-1476

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EXHIBIT VIII

WORK SCOPE DESCRIPTIONS FOR SERVICE CENTER TRADES AND SHOPS

CARPENTERS

- Wood and plastic laminate casework, including tables, cabinets, bookcases, carts, chairs, seats, desks, storage units, chart racks, mailboxes, office counters and shelves
- Display, key and trophy cases
- Doors, windows and weather-stripping
- Ceiling / acoustical tiles
- Drop-in, glue-up and suspended ceilings
- Vinyl and wood floors, cove base, baseboards, stairs, railings, treads and handrails
- Drywall and moveable walls
- Wood bathroom stall partitions
- Gyms, stages
- Chalkboards, tackboards, tack strips, blackboards and bulletin boards
- Pencil and projection screen blocks and brackets
- Interior and exterior trims
- Bleachers and benches
- Signs and placards
- Sanding floors
- Install new gym floor
- Build scaffold – repair roofs (wood parts) and seat-repair locks
- Make up shades.

STEAM FITTERS

- Steam and hot water heating systems, including boilers
- Gas and oil burners
- Perimeter radiation
- Air compressors
- Furnaces
- Cooling towers
- Air conditioning equipment
- Gas piping
- Unit ventilators
- Air handling units
- Pumps
- Compressor, vacuum & hot water
- Filter dryers

- Thermostats
- Dampers
- Louvers
- Steam traps
- Humidifiers and dehumidifiers
- Coils heating

ELECTRICIANS

- Electrical panels, sub-panels, motor control centers and service substations
- Lighting and power distribution systems
- Electrical receptacles
- Interior, exterior and exit lighting fixtures
- Kitchen equipment, including dishwashers, ovens, steam chests, garbage disposals, bun rollers, mixers, food conveyors and can crushers
- Industrial arts equipment, including lathes, drills, planes, welders and saws
- Electrical systems for HVAC, refrigeration, plumbing, swimming pool and other specialty equipment
- Hand and hair dryers
- Exhaust, supply and return fans
- Electric gates, door locks and keyless entry systems
- Circuit breakers, switches, fuses, ballasts, transformers, relays, raceways, sockets and lightening rods
- Design computer rooms
- Estimating

PLUMBERS

- Portable water distribution systems
- Sanitary and storm waste systems
- Gas piping systems
- Swimming pool piping, filtration and control systems
- Water heaters and tanks
- Kitchen equipment, including gas appliances, garbage disposals, dishwashers, steam chests , grease traps, ovens and four-burner ranges
- Sump pumps
- Sewer ejection systems
- Reduced pressure backflow preventers
- Catch basins
- Roof screens
- Fire sprinkler systems
- Group showers
- Drinking fountains
- Fixtures including sinks, faucets, soap dispensers, toilets, urinals, water closets, eyewash stations, lavatories and wash fountains

- Floor, sink and roof drains
- Science fixtures (gas, water &air)
- Sumps

PAINTERS

- Interior and exterior walls, doors and window frames
- Furniture, including tables, chairs, bookcases, cabinets, seats, desks and pianos
- Display and trophy cases
- Chalkboards and tackboards
- Gym and tot lot equipment
- Gym, wood and tile floors
- Ceiling/acoustical tiles
- Graffiti
- Swimming pool interiors
- Flag and light poles
- Lockers
- Interior and exterior wood, metal, brick, drywall, plaster, cement, enamel, concrete, plastic and vinyl surfaces
- Vinyl wall coverings
- Plaster walls, ceilings and other surfaces
- Drywall taping and finishing
- Interior-office complex, classrooms, lavatories, gym, lunchroom, auditorium, halls, stairwells
- Exterior-walls, portables, over-hangs, roof vents, windows
- Furniture, re-finish, stain, seal, varnish, tables, chairs, bookcases, desks
- Fire Repairs, remove fire odor, stain kill, repair smoke damage
- Art Deco, match existing graphics, marbleize, logos
- Gym floors, lay-outs, basketball, volleyball, tennis, shuffle board, team names
- Swimming pools, paint pool areas, repair and paint pools with stripes, anti-skid diving blocks, diving boards
- Locker rooms, shower rooms, anti-skid floors
- Flag poles, light poles
- Graffiti removal, exterior sand blasting, portables, schools
- Lockers, paint, stencil numbers, school colors, graphics
- Plaster, walls, ceilings
- Drywall, tape, finish, prime
- Drivers training ranges, lay-outs, yellow and white stripes
- Exterior, basketball courts, tennis courts
- Marbleize, wood grain, matching and repair
- Custom tint colors, match existing colors
- Wall paper, vinyl, application

GLAZIERS

- Interior-office partitions, classroom, lavatories, hallway, gymnasium, auditorium, cafeteria doors and windows
- Exterior-entrances & exits doors, sidelights, skylights
- Lavatories, locker rooms-mirrors
- Offices-plexiglass & glass desk tops, showcases
- Swimming pools-under water glass lens
- Flood lights-exterior glass lens
- Aquariums – tempered glass, plate glass
- Cutting-glass & plexiglass
- Fabricate – Aluminum metal frames
- Glass edgework – seaming & polishing
- Tempered & insulation glass – installation
- Showcase glass – sliding & fixed, glass shelves
- Picture frames – glaze
- Doors – exterior mail slots
- Windows – security speak holes & hand holes
- Caulking – interior & exterior
- Putting – exterior windows
- Installation

CONSTRUCTION TRADES

- Brick walls and walkways
- Concrete block walls
- Parapet walls
- Retaining walls
- Glass block windows, walls and wall partitions
- Boiler refractors
- Ceramic tile floors, walls, countertops and other surfaces
- Terrazzo floors
- Swimming pool interior walls and surrounding floors
- Decorative ceramic tile
- Ceramic art kilns
- Masonry Structures
- Stone Structures
- Smooth built-up roofs
- Slate roofs
- Rubber roofs
- Modified bitumen roofs
- Tile roofs
- Gravel roofs
- Roof coatings
- Wet plaster

- Maintain and repair plaster

MACHINE SHOP

- Kitchen equipment, including dishwashers, ovens, steam chests, garbage disposals, bun rollers, food conveyors, mixers, can crushers and small appliances
- Exhaust, supply, return, HVAC and vent fans
- Hydraulic and traction elevators, wheel chair lifts and dumb waiters
- Stokers
- Overhead doors
- Hoists
- Electric motors
- Heat, circulating, hot water, vacuum, sump and swimming pool filter pumps
- Small office equipment, including paper cutters, pencil sharpeners, staplers and pumps.
- Virtually any obsolete equipment

LOCK SHOP

- Door, window, wardrobe, cabinet and desk locks
- Controlled key systems
- Master key systems
- Electric strikes
- Electric panic bars
- Padlocks
- Keys
- Door closures
- Mechanical lockout cylinders

LANDSCAPE/HARDSCAPE SERVICES

- Asphalt playgrounds, sidewalks, parking lots, driveways and other surfaces
- Concrete playgrounds, sidewalks, parking lots, steps, gutters, curbs, walls, floors, ash pits, flag pole footings, loading docks and other surfaces
- Grounds, trees, shrubs, bushes and foliage
- Tot lots
- Fences, fire escapes, bicycle racks, wind screens
- Outdoor basketball and tennis courts
- Provide snow plowing, ice removal, sanding and salting services
- Hauling services for scrap, construction debris, rubbish, furniture, appliances and heavy equipment
- Flood, fire, storm and emergency cleanup services
- Scaffolding services

EXHIBIT IX

Flow Chart of Service Center

OPERATIONS

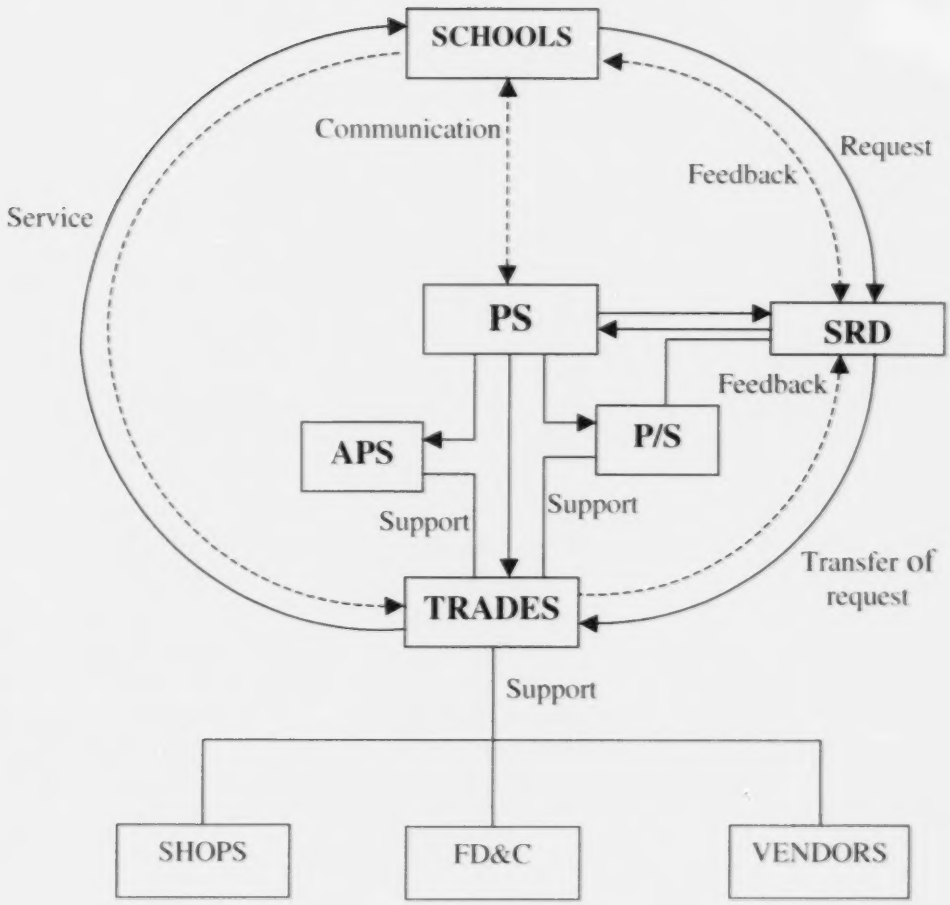

EXHIBIT X

FACILITIES' SERVICE CENTER
WORK REQUEST FORM

*PLEASE USE THIS FORM FOR ALL WALK-IN WORK REQUESTS

REQUESTED FOR :

SCHOOL/BLDG. NAME : _____

SCHOOL/BLDG. CODE : _____

REPORTED DATE : ___/ ___ /___/ REQUESTED DUE : ___/ ___/ ___/

DESCRIPTION :

_____

_____

_____

_____

_____

TRADE DEPARTMENT : _____

SUBMITTED BY : _____

AUTHORIZED BY : _____

_____

FSC USE ONLY

RECORDED BY : _____ DATE : _____

REQUEST NO : _____ WORK ORDER # : _____

EXHIBIT XI

DETROIT PUBLIC SCHOOLS — PHYSICAL FACILITIES

REQUISITION FORM FOR GOODS AND SERVICES

Requisition Date :	Department : CONSTRUCTION DEPT.	$ Amount	OFFICE USE ONLY Requisition # Entered By :
CONTRACT BUYER CODE	RECEIVER PURCHASE ORDER # :		
Vendor Name & Address Capital Bldg. Co. 14295 Schaefer Detroit, MI 48227		SHIP TO : Willis Warehouse (B. R. U.) FOR_____ ATTENTION OF : Mr. Forte (or) Mr. Murry ATTENTION TELEPHONE # :	
Date Required :	Requisition Fraight $	WORK ORDER # : 1 - _ _ _ _	JOB

OFFICE USE ONLY

ACCOUNT NUMBER : 10.0000. .80700.83338.00

QUANTITY X UNIT COST = TOTAL COST

(1) UNIT/S OF MEASURE :	QUANTITY	UNIT COST $	TOTAL COST $
ITEM NAME / DESCRIPTION :			
VENDOR PART # :			
(2) UNIT/S OF MEASURE :	QUANTITY	UNIT COST $	TOTAL COST $
ITEM NAME / DESCRIPTION :			
VENDOR PART # :			
(3) UNIT/S OF MEASURE :	QUANTITY	UNIT COST $	TOTAL COST $
ITEM NAME / DESCRIPTION :			
VENDOR PART # :			
(4) UNIT/S OF MEASURE :	QUANTITY	UNIT COST $	TOTAL COST $
ITEM NAME / DESCRIPTION :			
VENDOR PART # :			

DESCRIPTION OF USE :

		APPROVALS	
		Unit Supervisor	Date
(313) 494-1468 Telephone #	Date	Department Head	Date

USE BACK OF SHEET TO CONTINUE DESCRIPTION OF USE IF NECESSARY

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EXHIBIT XII

PAINTING/GLAZING

DETROIT PUBLIC SCHOOLS
BUILDING REPAIR UNIT
DAILY TIME SHEET AND LABOR DISTRIBUTION

SCHOOL TARGET SITE	PERSONAL ASSIGNED	JOB NUMBER	ESTIMATED TIME	DAILY TIME	ACTUAL TIME	COMPLETION DATE/PERCENTAGE
LUDINGTON	G. STANLEY	# 17398	250	8	99	40%
	K. HOTCHCRAFT			10		
	J. PHEIPS			10		
LARNED	M. GABRIEL	# 17225	250	10	146	70%
	E. DANTZIER			10		
	A. CARTER			10		
(SICK)	H. DREW			01		
(SICK)	K. WEAVER			01		
TAFT	K. JONES	# 17050	275	8	125	35%
	T. JONES			8		
	L. MCELRATH			8		
GLASS SHOP	D. FULLER			10		
(OFF)	S. HAYES			07		
(VACATION)	H. HUNTER			04		

SUPERVISOR SIGNATURE : _____ **DATE :** 8 - 2 - 99

TRADE : GLAZING

EXHIBIT XIII

FAX

Date : July 30, 1999

BI-WEEKLY STATUS REPORT
PAINTING/GLAZING DEPARTMENT

TO : WILLIAM A. JENIFER, ED.D.
EXECUTIVE DIRECTOR
PHYSICAL FACILITIES

FROM : LEE DEVERS, GENERAL FOREMAN
PAINTING/GLAZING DEPARTMENT

NUMBER OF PAGES INCLUDING COVER : 4

COPY/
Dewitt Lee
Cal Williams
Larry RedFearn
Marvin Brantley

ACTIVITY REPORT
PAINTING

ENDING : July 30, 1999

DATE REC'D	LOCATION	JOB/REC#	DESCRIPTION OF WORK	START DATE	GOODS & SERVICE SHEET	COMP. DATE
06/99	TAFT	16259	23 CLASSROOMS, 8 LAV'S, 1ST FLOOR HALLS AND LOCKERS	06/04/99	MATERIAL APPROVED-Hold For final completion of painting after carpenters complete their work.	98%
06/99	PITCHER	16249	25 CLASSROOMS, 4 LAV'S 1ST LAVATORY	06/07/99	MATERIAL APPROVED-Additional work-The 2nd floor hall is scheduled for painting after constellation responsibilities have been completed.	07/22/99
06/99	BOW	16082	33 CLASSROOMS, 6 LAV'S, 1ST FLOOR	06/07/99	MATERIAL APPROVED-Additional work: Paint 2nd floor hall after electrical and floor tile.	07/31/99
06/99	LARNED	16252	8 CLASSROOMS 4 LAV'S, 1ST FLOOR HALL	06/99	MATERIAL APPROVED-Additional work: Paint auditorium ceiling, and finish new drywall patrician.	07/19/99
06/99	LUDINGTON	16250	30 CLASSROOMS, 4 LAV'S, ALL HALLS AS NECESSARY	07/12/99	MATERIAL APPROVED-Painting was delayed 7 days due to additional work that was approved for the McKenny School.	07/28/99
06/99	HENRY FORD HIGH	16267	93 CLASSROOMS, 30 LAV'S 1ST AND 2ND FLOOR LOCKERS	07/14/99	MATERIAL APPROVED-Seeking approval to paint all entrances and exterior doors.	40%
04/99	SCHOOL CENTER	16267	VARIOUS ASSIGNMENTS PER DR. JENIFER	04/99	MATERIAL APPROVED	ON-GOING, Permanent Assignment
07/99	MCMILLAN	17687	SANDBLAST SIDEWALKS DUE TO DAMAGE MADE BY COMMUNITY FIX-UP DAY	07/30/99	MATERIAL ON HAND	50%
07/99	SCHOOL CENTER	WO# Requested-Service Call Down	REPAIR ROOM 514 AS NECESSARY DUE TO PARTICIAN REMOVAL-PER L.REDFEARN	07/31/99	MATERIAL ON HAND	07/31/99
07/99	DREW	WO# Requested-Service Call Down	PAINT NEW SECURITY ROOM AS NECESSARY-PER D. LEE	07/29/99	MATERIAL ON HAND	07/29/99

ACTIVITY REPORT
GLAZING ASSIGNMENTS
WEEKENDING 7-30-99

DATE REC'D	LOCATION	JOB-REQ #	DESCRIPTION OF WORK	START DATE	DATE OF GOODS & SERVICE SHEETS/STATUS/ COMMENTS	DATE COMPLETED
6-14-99	Noble Elementary	WO # 16599	Replace broken wire door glass for classroom 126.	7-13-99	Materials On Hand	7-13-99
7-12-99	Murray High	WO # 17468	Replace gym window in southwest corner. Entire framed kicked out.	7-14-99	" " "	7-14-99
7-13-99	Harding Elem.	WO # 17472	Replace broken glasses in office complex – principals office door counselors office window glass.	7-14-99	" " "	7-14-99
7-15-99	Harding Elem.	WO # 17524	Install glass in an exterior storage room door.	7-14-99	" " "	7-14-99
7-14-99	Davis Aerospace	WO # 17490	Replace broken exterior windows (2) due to B. & E.	7-14-99	" " "	7-14-99
7-14-99	Mark Twain Elem.	WO # 17114	Replace broken insulated window pane in portable.	7-14-99	" " "	7-14-99
7-15-99	Osborn High	WO # 17493	Replace 2 outside windows, doors to drivers education building.	7-15-99	" " "	7-15-99
7-12-99	Schulze Elem.	WO # 17460	Replace broken exit door glass in exit # 4.	7-15-99	" " "	7-15-99
7-15-99	Marquette Elem.	WO # 17492	Replace entrance door glass on Westside of building.	7-15-99	" " "	7-15-99
7-15-99	A.L. Holmes Elem.	WO # 17523	Replace bottom of window frame in main office due to B. & E. Unable to secure building.	7-15-99	" " "	7-15-99
6-25-99	Bates Academy	WO # 17077	Replace broken windows in the following locations, room 118, gym door glass, main entrance outside door, 3rd floor hall window.	7-15-99	" " "	7-15-99
6-7-99	Murphy Middle	WO # 16191	Replace exterior window pane in room 101, broken out over weekend.	7-15-99	" " "	7-15-99
7-8-99	Henry Ford High	WO # 17406	Replace broken Plexiglas with panel # 15 on outside exit door # 7.	7-16-99	" " "	7-15-99

BEST COPY AVAILABLE

EXHIBIT XIV

Date : _____

COMPLETION FORM

Service Call # _____ Trade : _____

School : _____

Start Date : _____ Finish Date : _____

Total Man Hours : _____

Labor Cost : _____

Material Cost : _____

Number Of Man Assigned : _____ Supervised By : _____

Additional Comments : _____

_____

_____

_____

Information Provided By : _____

General Foremans Signature : _____

Names of tradesman assigned to this site : _____

_____

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EXHIBIT XV

FACILITIES MANAGEMENT PLANNING / SCHEDULING DEPARTMENT

DAILY TIME SHEET LABOR DISTRIBUTION

School	ASBESTOS	BRICKMASON	CARPENTERY	CEILING TILE	CEMENT	ELECTRICIAN	FLOOR TILE	GLAZIERS	LABORERS	LOCKSHOP	MACH.SHOP	PAINTERS	PIPECOVERS	PIPEFITTERS	PLASTERERS	PLUMBERS	ROOFERS	SEWER	SHADES	SHEET METAL	S/FITTER	T/CONTROL

EXHIBIT XVI

DAILY REPORT

CO-ORDINATOR JANICE MARSHAL

SCHOOL NAME _____

TRADE PERCENTAGE TAKE-OFF

STARTING DATE _____ ENDING DATE _____

ELECTRICAL %_____

CARPENTERY %_____

PLUMBERS %_____

PIPEFITTERS %_____

PIPECOVERERS %_____

PAINTERS %_____

COMMENTS :

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EXHIBIT XVII

DETROIT PUBLIC SCHOOLS

BUILDING REPAIR TRADES

TRADES	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
BRICKMASONS											
CARPENTRY											
CEILING TILE											
CEMENT											
ELECTRICAL											
FLOOR TILE											
GLAZIERS											
LOCKSMITH											
MACHINE SHOP											
PAINTERS											
PIPECOVERS											
PIPEFITTERS											
PLASTERS											
PLUMBERS											
ROOFERS											
SEWER GANG											
SHADE SHOP											
SHEETMETAL											
TEMP. CONTROL											

EXHIBIT XVIII

DETROIT PUBLIC SCHOOLS

FACILITIES MANAGEMENT AND CAPITAL IMPROVEMENTS

CLASSROOM NEEDS ASSESSMENT

School THE LOVING Phone Number 313-555-5555

(Check box below if correction is necessary)

CLASSROOM NUMBER											
LIGHTING											
PAINTING											
PLASTERING											
WINDOWS											
SHADES/DRAPES											
CHALKBOARDS											
FLOOR/CARPET/TILE											
CEILING TILE											
CLASSROOM DOORS											
Remarks :											

DEVELOPMENT OF A SAFETY PROGRAM FOR DCPS

Presented by

Mumtaz A. Usmen, Ph.D, PE

Penn Center, Washington, D.C.

June 13, 2000

DELIVERABLES AND SCHEDULE

1. SAFETY MANUAL (Hard Copy)

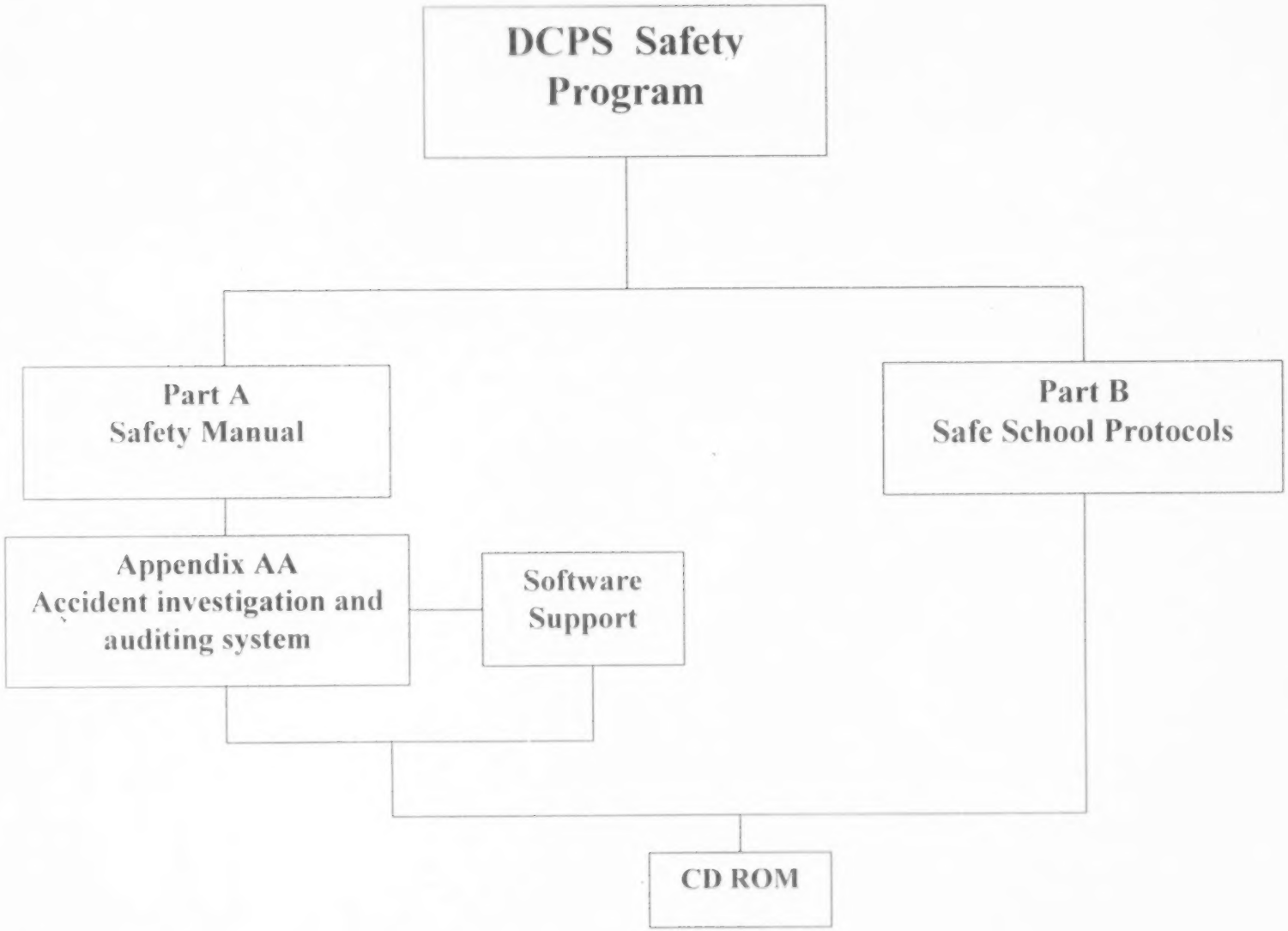
Final Draft due: 9 / 29 / 2000

- **Part A– Workplace safety** – *Draft due: 8/18*
- **Part B – Safe school protocols** – *1st draft: 8/18 – Final Draft: 9/29*
- **Appendix AA:** Accident investigation & auditing system with software (CD) – *Final Draft: 8/18*
- Training sessions on Appendix AA (*Two 8-hour sessions) – After 8/18 (TBD)*

2. SAFETY MANUAL (ON CD ROM)

- **CD ROM - Interactive version**
- **Combines Part A and Part B**
- **Web - ready**

Final Draft due: 9 / 29 / 2000


DCPS Safety Program
Part A Safety Manual
Part B Safe School Protocols
Appendix AA Accident investigation and auditing system
Software Support
CD ROM

PART A

Construction Safety Manual

CONTENTS OF CONSTRUCTION SAFETY MANUAL

- POLICY STATEMENT
- ROLES AND RESPONSIBILITIES
- PROGRAM IMPLEMENTATION
- SAFETY MODULES

POLICY STATEMENT

- Safety is top priority
- Safety and Health Program requirements for DCPS tradesmen and contractors
- Goal: Zero accidents and injuries
- Commitment of resources

ROLES AND RESPONSIBILITIES

- Organizational structure (internal and external)
- Roles and responsibilities of contractual parties
  - Architects and design engineers
  - Project and field engineers
  - Construction managers
  - General contractors
  - Subcontractors
  - Tradesmen / DCPS personnel

SAFETY PROGRAM IMPLEMENTATION GUIDELINES

SELECTION OF SAFE CONTRACTORS

- Safety performance
- Contractor screening
- Evaluation criteria
  - Experience Modification Rating
  - Injury frequency and severity rates
  - Safety program evaluation
  - OSHA citation history

MEETINGS AND COMMUNICATIONS

- Safety committees
- Safety toolbox meetings
- General safety rules
- Action plan for OSHA site inspections
- Job site posting requirements

SAFETY PROGRAM DOCUMENTATION AND EVALUATION

- Record keeping
- Accident investigation
- Information management
- Safety monitoring and auditing
- Checklists
- Software support
- TQM framework

SOFTWARE SUPPORT

- **OSHALOG by Safety Software Inc.**
  - **Three versions:Plus, Manager, Manager Plus. Plus is the basic version, the others have powerful networking options**
  - **Accident investigation, record keeping and data analysis**
  - **Tracks completion of corrective actions**
  - **Generates a comprehensive database**
  - **Generates OSHA Forms 101 and 200**
- **Microsoft Excel used as audit and information management instrument**
  - **Program audit**
  - **Field audit**

SAFETY ORIENTATION AND TRAINING

- Training policy and program
- Safety awareness training
  - 10 Hour OSHA Outreach Training Program
  - 30 Hour OSHA Outreach Training Program
- Project specific training

SAFETY MODULES

- **HAZARD COMMUNICATION**
  - **Written Hazard Communication Program**
  - **Hazardous chemicals (asbestos, lead, silica, cadmium, etc.) - Health effects (carcinogen, corrosive, toxic, irritant, organ effects)**
  - **MSDS (Material Safety Data Sheet)**
  - **Training requirements**
  - **The Right To Know Law**
- **LOCKOUT / TAGOUT PROGRAM**
  - **Control of hazardous energy**
  - **Written Program**
  - **Lockout/Tagout devices**

- **EMERGENCY ACTION PLAN**
  - Fire, bomb threat, severe weather
  - Emergency evacuation
  - Emergency exits
  - Handling of personal injuries
- **FIRST AID AND MEDICAL REQUIREMENTS**
  - Communication and transportation
  - First aid training
  - First aid supplies
  - First aid stations, phone numbers

- **PERSONAL PROTECTIVE EQUIPMENT (PPE)**
  - **Eye protection**
  - **Face protection**
  - **Head protection**
  - **Foot protection**
  - **Hand Protection**
- **MATERIALS HANDLING**
  - **Housekeeping**
  - **Proper lifting**
  - **Ergonomics**
  - **Material storage**
  - **Material disposal**
  - **Hot object handling**

- **HAND & POWER TOOLS**
  - Grinding and abrasive machinery
  - Power saws and woodworking machinery
  - Pneumatic tools
  - Explosive-actuated tools
  - Chainsaws
  - Abrasive blasting equipment
  - Guarding, grounding, maintenance and inspection of tools
- **BLOODBORNE PATHOGENS**
  - Blood, blood fluids, open cuts and puncture wounds: potential hazards
  - Proper Personal Protective Equipment
  - Disposal of contaminant items

- **FALL PROTECTION**
  - **Guardrails**
  - **Personal fall arrest systems (Harness and lanyards)**
  - **Safety net systems**
  - **Wall & floor holes and openings**
- **LADDERS & STAIRWAYS**
  - **General requirements**
  - **Proper usage of ladders**
  - **Portable ladders**

- **SCAFFOLDS**
  - Railings and toe boards
  - Planks and platforms
  - Supported and suspended scaffolds
  - Falling object protection procedures
- **RIGGING SAFETY**
  - Ropes and chains
  - Slings
  - Rigging hardware
  - Proper rigging techniques

- **CRANE AND DERRICK SAFETY**
  - **Operator training**
  - **Operating procedures**
  - **Material hoists**
  - **Overhead power lines**
  - **Hand signals**
  - **Barricades**
- **CONFINED SPACES**
  - **Definitions and fundamentals**
  - **Permit required confined space program**
  - **Proper training**
  - **Entry supervisor**
  - **Rescue services**

- **FIRE PROTECTION & PREVENTION**
  - **Fire protection program**
  - **Fire fighting equipment (portable & fixed)**
  - **Fire alarm systems**
  - **Fire prevention procedures**
- **ELECTRICAL SAFETY**
  - **Cords, cables, plugs and receptacles**
  - **Electrical conductors and equipment**
  - **Transformers and high voltage equipment**
  - **Managing hidden electric circuits**
  - **Ground-fault protection**
  - **Marking of electric panel boxes and main disconnects**

- **WELDING & CUTTING**
  - Compressed gas cylinders
  - Gas welding/arc welding/cutting devices
  - Ventilation
  - Proper Personal Protective Equipment
- **EXCAVATION & TRENCHING**
  - Safe access and egress
  - Shoring systems
  - Sloping and benching
  - Locating underground utilities and pipelines
  - Loose rock and soil protection
  - Adjacent structures

- **CONCRETE & MASONRY CONSTRUCTION**
  - **Formwork and shoring**
  - **Precast concrete operations**
  - **Flooring**
  - **Roofing**
  - **Masonry construction**
- **STEEL ERECTION**
  - **Design hazards**
  - **Advanced planning**
  - **Erection hazards**
  - **Structural steel assembly**

- **DEMOLITION SAFETY**
  - **Demolition plan**
  - **Barricading**
  - **Hazardous substance management (asbestos, lead)**
  - **Debris removal**
  - **Wall, floor, steel removal**

- **HEAVY CONSTRUCTION EQUIPMENT**
  - **Scrapers, graders, bulldozers, rollers, conveyors**
  - **Guarding devices**
  - **Proper loading**
  - **Piledrivers**
  - **Drilling equipment**
  - **Traffic and transportation safety**
  - **Trucks and driving safety**
  - **Pedestrian safety**
  - **Barricading**
  - **Signaling procedures**
  - **Traffic signs and devices**

- **SANITATION**
  - **Drinking water**
  - **Toilets**
  - **Washing facilities**
  - **Food service**
  - **Waste disposal**
  - **Vermin control**
- **SUBSTANCE ABUSE**
  - **Drug and alcohol screening program**
  - **Random & periodic testing**

- **SAFETY OF MAINTENANCE OPERATIONS**
  - **Landscape and ground maintenance operations**
  - **Property / equipment maintenance**
  - **Plumbing, pipefitting, HVAC, sheet metal,boiler maintenance**
  - **Carpentry and structural maintenance**
  - **Installation of fixed equipment**
  - **Painting operations**

PART B

SAFE SCHOOL PROTOCOLS

OBJECTIVES

- Assist designers in development of specifications for
  - new construction
  - school renovation
  - maintenance
- Recommend construction techniques and precautions to ensure safety and productivity during
  - instructional hours
  - in occupied facilities

- **Address safe construction materials and installation procedures to be used in the educational environment**
- **Recommend safe working procedures and scheduling protocols to be used in the educational environment**
- **Address safe conditions that require removal of children from construction proximity**

SCHOOL ENVIRONMENT

- Students
- Teachers
- Principals and staff
- Custodians
- Building engineers / maintenance personnel
- Visitors (Public and parents)
- Tradesmen

DETERMINATION AND CONTROL OF HAZARDS IN THE SCHOOL ENVIRONMENT

- **Integration of Safety information from Part A with school environment**
  - **Investigate how people in the school environment can be exposed to the same hazards that the workers are exposed to.**
  - **Determine the hazards that the untrained people in the school environment can be exposed to - -The project team will "walk through" every possible work activity (left) with exposures, and will identify ways these exposures can be controlled.**

SAFE CONSTRUCTION MATERIALS

- HAZCOM (Hazard Communication) standard is the main basis for the choice of materials in
  - Construction
  - Renovation
  - Maintenance
- Study implications for design / specification development
- Provide guidelines

TRAINING & ORIENTATION

- **Training of the construction personnel on how unguarded exposures can hurt non-construction personnel who have not been trained in hazard recognition and control.**
  - **Hazard awareness training (considering outsiders)**
  - **Controlling the hazard by enclosing or guarding it at its source**
  - **Project specific training**
- **Orientation for students and school staff**
- **Signs and posters**

OTHER ISSUES

- Integration of roles and responsibilities in Part A with school environment.
- Role of school police in supporting safety related programs and activities
- Emergency plan for Part A should include all people in the school environment
- Safe transportation and grounds work in the school environment
- Proper scheduling of construction activities to minimize exposures

FURTHER RESEARCH

- Study general safety literature
- Determine how can general safety principles, exposures and controls be applied to an occupational work environment where there are untrained outsiders
- Research on air quality standards and containment procedures that may affect the school environment

WE WILL APPRECIATE YOUR FEEDBACK, COMMENTS AND QUESTIONS.

THANK YOU !